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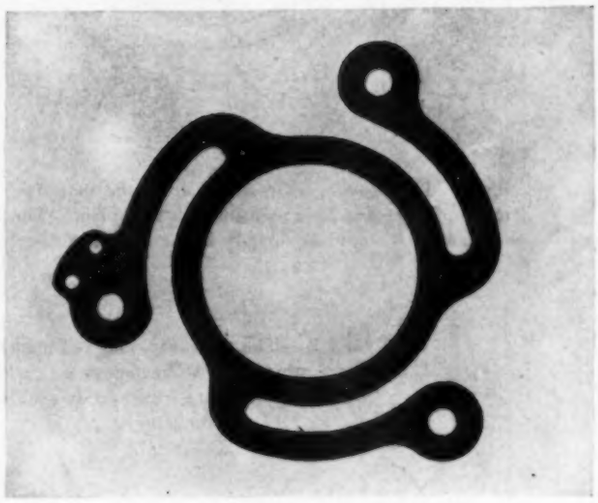


MANY shops feel the pressing need for a new drafting technique that will minimize errors and will relieve the shop man from finishing the draftsman's job. This article discloses the inadequacy of present drawings and demonstrates a new technique

REDIMENSIONING for the Jig Borer

C. W. HINMAN and CHESTER B. LORD
Chief Tool Designer, Kobzy Tool Co.
Associate Editor, American Machinist

SLOWLY, the old order changeth. First the blacksmith watched the power forger supersede his manual skill. Then the all-round machinist sought new fields as the machine operator took his place. Now the last citadel is falling, the jig borer threatens, or promises, as one looks at it, the extinction of the all-round diemaker, and to an extent, the elimination of jigs and fixtures also.

Outside of large automobile companies and those machine tool builders who specialize in tools for their own machines, the engineering department has not been much concerned with tooling. Quantity justified the making of a tool or die, not accuracy. Even where it was known that a tool or die would be necessary, the engineering department made no attempt to outline the type of die to be used, or to place any dimensions on the drawing that would help the diemaker in making the die. If the draftsman preferred to use chords, he used them; if degrees of angle, he used them, and then he destroyed the work he had done to arrive at his results. The diemaker either laid out the angles and chords by graphics, worked them out in trig and laid out his templet, or set his buttons. In either event he was duplicating the work of the draftsman.

Then entered the jig borer and the necessity for an entirely new technique. Management had not been disturbed by watching highly paid tool or diemakers leaning over their benches with a pad and pencil, figuring out a drawing. There did not appear to be anything incongruous about it, because the man himself was working. The general impression was one of activity even though it was not productive activity, and in some cases the toolmaker was waiting for work being done on some other machine. The jig borer is not an ordinary machine any more than a toolmaker is an ordinary mechanic. Its

This article is in two parts. The second will appear next week.

cost in proportion to an ordinary machine bears about the same relation as the yearly pay of the toolmaker does to that of a machine operator. To see one of these expensive machines standing idle made an entirely different impression on management. From reading the description of the jig borer, the shop executive had imagined that all that was necessary to lay out a circle of bushing holes in a jig was to start at zero, turn the micrometer wheels so many times and drill a hole, go back to zero, adjust the universal table to a given angle and start again. This may be true where simple holes are concerned, like those in a multi-impression mould for plastic compounds, or bushing holes of not too close tolerances, but it does not always hold. The jig borer supplements the skill of the toolmaker; it does not replace it.

The jig borer is a wonderfully accurate machine, and the only reason why it cannot always come within its guaranteed 0.0001 in. of accuracy lies with the human equation and not with the machine. And the reason why the operator of the jig borer cannot go ahead and make a die from a working drawing is because of our makeshift drafting practice and not because of any defect in the machine.

There has long been a complaint among shop men that drawings were made for engineering records rather than for shop instructions. The draftsman has always

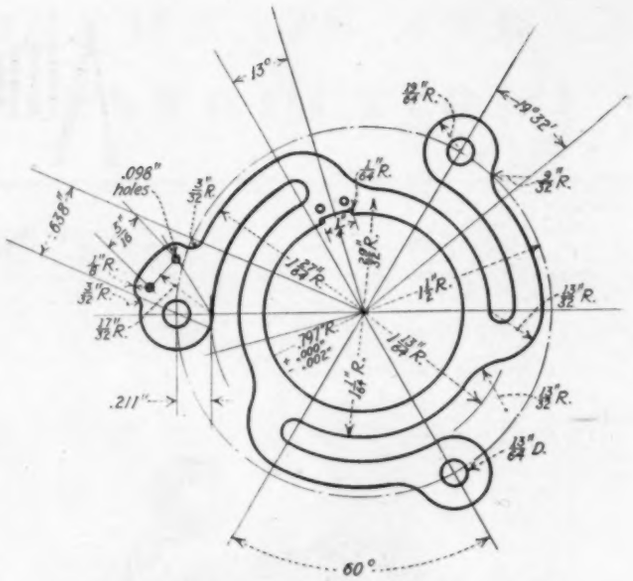
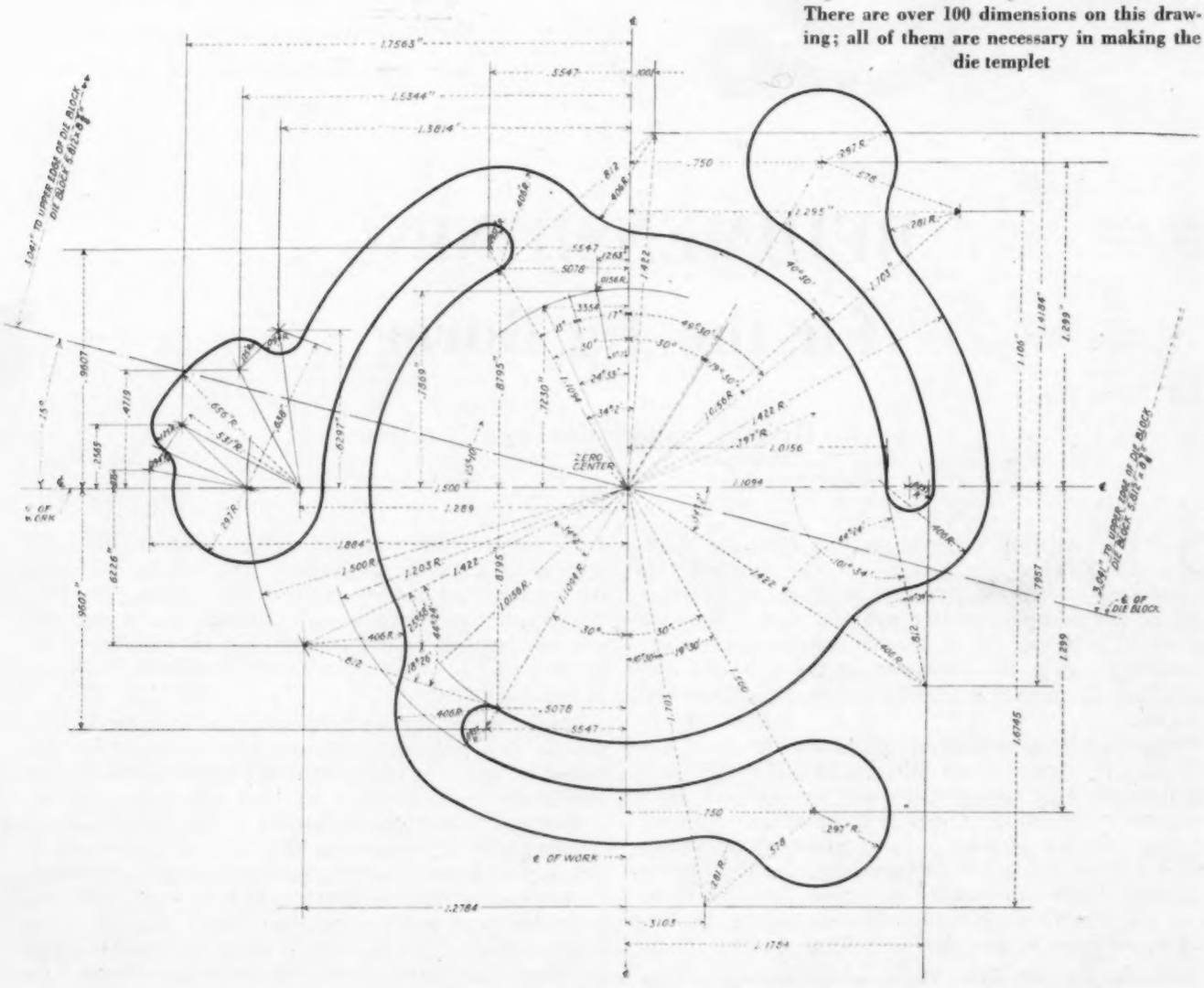


Fig. 2—The drawing as received from the manufacturer. There are 24 dimensions on this print. The diemaker would ordinarily figure out the rest

Fig. 3—The drawing as redimensioned. There are over 100 dimensions on this drawing; all of them are necessary in making the die templet



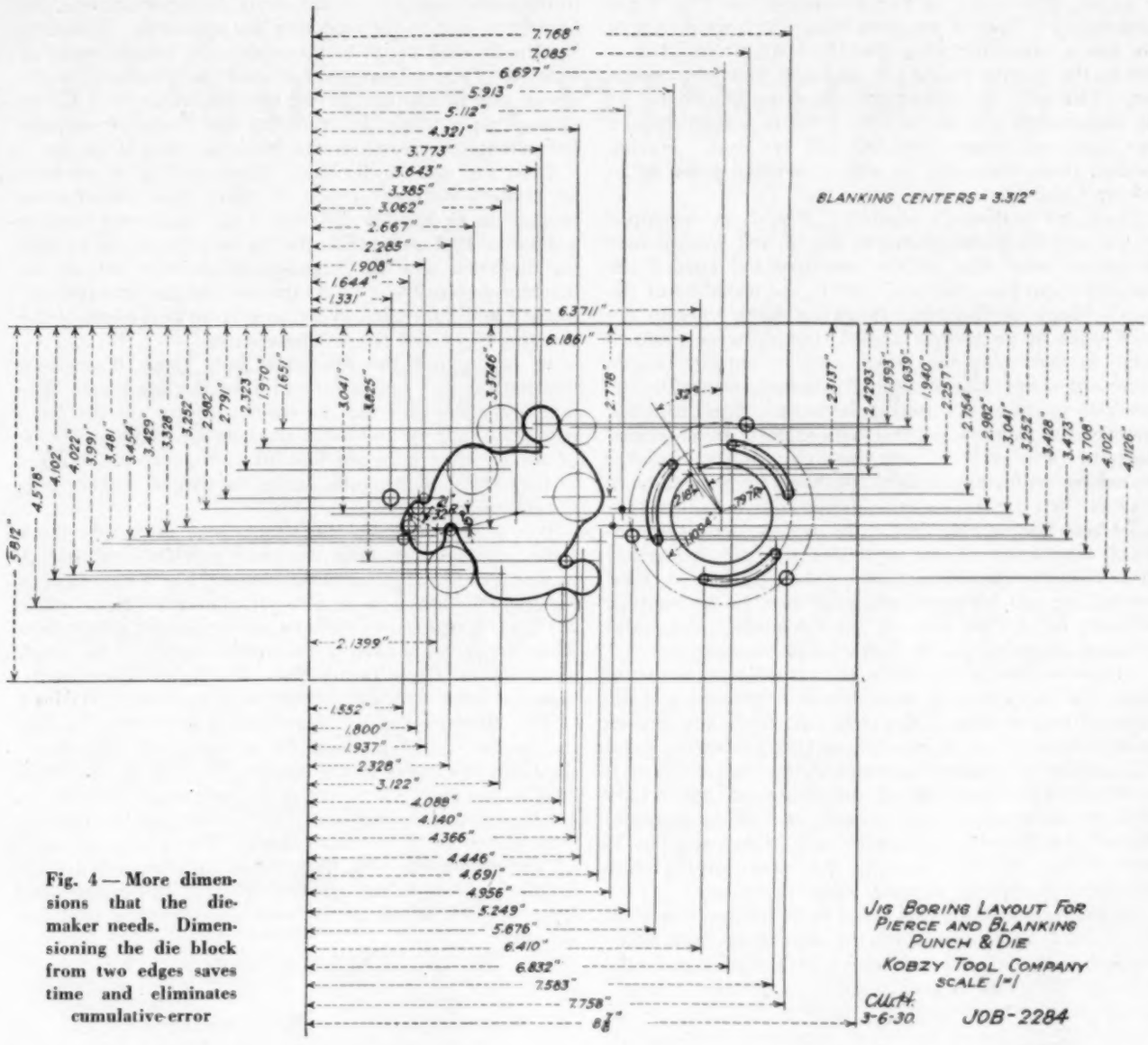


Fig. 4 — More dimensions that the diemaker needs. Dimensioning the die block from two edges saves time and eliminates cumulative error

retorted that he was not a diemaker and could not see what additional information the diemaker required; if he could he would gladly furnish it. And there the matter has rested.

The new technique of drafting developed by the Kobzy Company along with the use of the jig borer is not, therefore, something made necessary by the jig borer, but something that should have been introduced at the beginning of diemaking. It would have saved just as much time, comparatively speaking, then as it does now. That the jig borer merely visualized the idle time, and proved the incentive to better drafting practice, is purely incidental. This same drafting practice can be extended to other work with equal advantage. Some companies have already adopted the new method for fixtures and dies. They reap their reward in cheaper prices on the work they send outside.

With a simple jig, the blueprint can be handed direct to the operator of the jig borer, who will proceed as explained in the instruction book of the machine and produce as good or better fixtures than can be done by the button method and in less than half the time. It becomes a machine operation instead of a toolmaker's job. Simple jig work, therefore, generally speaking, has become routine work no longer requiring extraordinary care nor skill.

It is possible to simplify diemaking to a greater proportional degree by properly dimensioned drawings, because the form of the punching is usually comprised of many straight lines, curvatures, and arcs of radii meeting tangentially. All of which must be definitely located.

An example of what is needed is illustrated by the part shown in Fig. 1. This "spider," as it is called, was made for a concern that still uses the orthodox technique of dimensioning drawings. It will be interesting to follow the part drawing through the various processes necessary to make it available to the jig borer. The part shown is from the die made from the drawing, Fig. 2, submitted by the customer. The customer's engineering department knew what they wanted, and their drawing gave all the information necessary for making it, but not in a form available to the diemaker. The dimensional prints, Figs. 3 and 4, show how the part should have been dimensioned. The immediate reaction will

be to say that many of the dimensions on Fig. 3 are unnecessary. Even if we grant that, which we do not, it is a rule of manufacturing that the nearer completion a part is, the greater the care to be taken to prevent spoilage. There is no economy in figuring out some of the dimensions and not checking them against related ones, and this means checking 100 per cent. Having checked them, they may as well be written down in an orderly fashion.

From the customer's blueprint, Fig. 2, is developed the die templet layout shown in Fig. 3, and from it may be gained some idea of the mathematical burden the drafting room has always shifted to the shouders of the shop. Many of the dimensions are cases wherein the three sides of an oblique angled triangle were given in order to determine the other sides of interior angles whose sides were the straight dimensions wanted. The formulas for these are among the most difficult in trigonometry and must be figured with at least four decimal places to avoid error. Truly the ability of the diemaker has not been fully appreciated, as shown by his difference in rate.

Starting from a zero center, the development is dimensioned both sides of the vertical and horizontal center lines. This redimensioning serves two purposes. First for drilling and boring all the radii for the die templet, and later for drilling holes in the die-block at the center distances given on the die-block layout drawing.

After the layout is made the usual practice is to figure out the width of stock that will be used and the angle of progression of the part. At times the part to be blanked is placed at an angle so that protruding parts will overlap and thus save material; at other times it is done to reduce the width of material used, and at still others because holes or projections come at inconvenient places. In this case the angle of progression is 15 degrees from the line through the center of the piece and the center of the terminal lobe.

In the Kobzy shops it is usual to make the templet of $\frac{1}{16}$, or $\frac{3}{32}$ C.R. steel. After the radii have been bored the rest of the templet is shaped and draw-filed and used in the usual manner. If the die is an important one, the templet is sent to the customer for approval. Similarly, for the finished die to be acceptable, the templet must fit exactly. This is the method whereby we check our work. It can also be clamped to the templet holder of a Keller die-sinking machine for profiling the irregular surfaces for making the punch or for working out a large die.

In laying out the die block shown in Fig. 4, we have an entirely different object in view, and consequently proceed in an entirely different way. Here, we prepare a drawing that will enable the jig borer operator to bore his die-block with as little loss of time in setting his machine as possible. To do this we use the "stepped-up" method and dimension everything from two edges of the die, the upper and the left-hand ones.

In laying out the die-block, only those dimensions locating interior radius holes for boring are used. The operator then uses the dimensions shown on the piece part print, Fig. 3, and bores the hole accordingly. Some of the exterior radii are laid off to register the location of the corresponding radii on the die templet, for scribing the complete outline.

It will be noted that the dimensions of the die-block to be used were given on the piece part drawing, Fig. 3, as was also the angle of progression. For a two-step, or progressive die there is also an allowance to be made in the center-to-center distance of the two blanking steps. This dimension is usually the overall length of the blank along its horizontal center line, plus the thickness of the material from which the blank is to be made.

The blanking step in this instance is 3.312 in. This means that 3.312 in. must be added to all dimensions locating the centers in the blanking step at the left-hand side of the dieblock to arrive at the correct dimensions for the corresponding center in the first, or perforating, step, at the right of the dieblock. The 15-degree angle of inclination has also been taken care of and the operator has but to set off the different dimensions and bore or prick punch as the piece part drawing calls for.

(To be continued)

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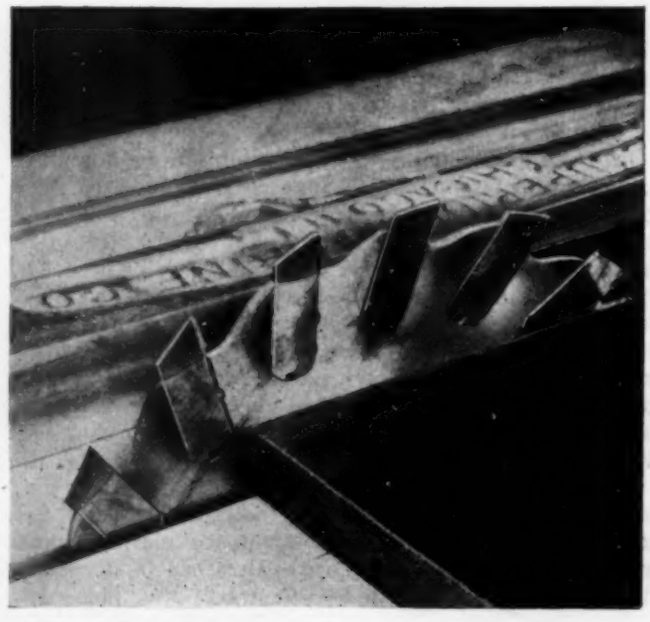
Score One for Tungsten Carbide

GEORGE E. HOPF
Henry Disston & Sons, Inc.

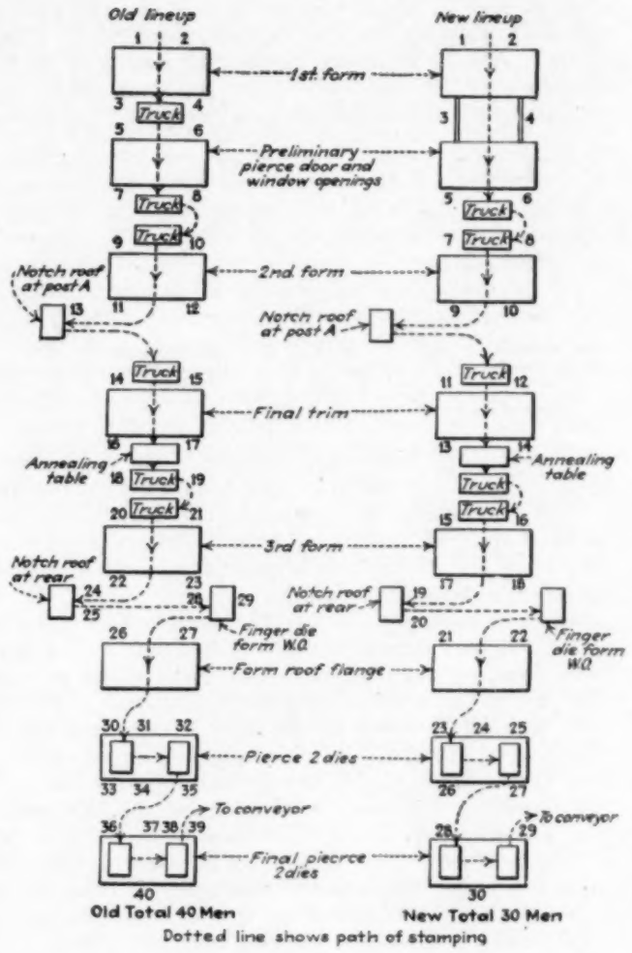
PHENOL compositions present difficulties in fabrication because of their abrasive action on cutting tools. For example, after cutting about 60 ft. of ½-in. resinoid, carbon-steel saws or knives must be removed and resharpened. Mr. Chamberlain, Works Superintendent of the I-T-E Circuit Breaker Company, recognizing this fact, induced the Disston company to undertake research work on various other cutting materials. A 10-in. saw fitted with fourteen Carboloy teeth was developed and tried on the resinoids, with the result that one day's cutting exceeded that accomplished in a month by former methods. Since that time, the Carboloy-fitted saw has cut approximately 10,000 ft. of fiber shapes without refitting. Another advantage claimed for this method is the lack of burring.



Close-up of teeth of a Disston tungsten-carbide saw

ANALYZING PRESS LINEUPS

JAMES K. MATTER



IN THE sheet metal stamping business, a great deal of attention is given to dies. Everybody, from the president on down, gets into problems of die design, die construction, and die tryouts—especially tryouts. As a consequence, other important points are sometimes neglected.

It is true that the nature of dies is such that they demand attention and skill of a very high order. For instance, a die is set, and perhaps 10,000 satisfactory stampings are produced from it. A few days later it is set again on the same press, with the same bolsters and knockout pins, and a usable stamping simply can not be made from it. The machinists may spend three weeks on it before it runs again. It is a common sight in a large press shop to see as many as a dozen determined executives grouped around one press, all striving desperately against time to coax one refractory die into shape.

When dies are finally gotten into condition where they will run, it is, perhaps, natural that little real attention is given to the matter of just how they shall run. A general feeling exists that with the okaying of sample stampings by the inspection department all the real work is done.

Because of this feeling, a large proportion of stamping operations are overmanned to an extent that, at times, borders on the ridiculous. It is safe to say that a good industrial engineer could go into any large press shop and, by careful study and analysis, could take off an average of at least fifteen per cent of the operators on almost any lineup.

There are certain definite, common-sense principles to apply in the study of any lineup with the viewpoint of eliminating excess men. It is the object of this article first to outline these principles, and then to illustrate their application, using as an example an actual condition that has been handled by these methods.

The first question that might be asked is: Why a lineup at all? Why tie up a dozen presses for one stamping at one time? Why not use half the presses for other needed jobs?

The answers are many. In the first place, it is impossible at times to get an inspector's O.K. on the first operation until the piece has been put through the following dies. Succeeding dies may develop flaws not visible in the first operation. Another answer is, storage and handling costs. If stampings are not to be run through immediately, they must be loaded on trucks, carted somewhere, and stacked. This excess handling runs the cost up so high that lineups are preferable.

Many times we find that the slowest press in a lineup is in the middle of the line. We find that the preceding and following presses can make, say, 350 pieces an hour, but that the key press can only make 160 pieces an hour. As long as we are going to run that lineup as a lineup our production can be no greater than that of the slowest press.

If the key press is slow because of the drive it may pay to enlarge the driving pulley. If the center distance is short, use an idler, or reverse the motor and cross the belt. Some engineers will argue about a crossed belt, but there are times when it solves the problem.

If the proper speed requires more power it may pay to put on a larger motor.

If the operation is slow because of die conditions, such as breaking punches if run too fast, call in the steel men and find the steel that will stand up. If the slow operation is a drawing one and the metal tears if the press is speeded up, call in lubricant people and steel men to see what they can offer.

If the operation is slow because of insufficient men,

by all means man it so that maximum production may be attained. When satisfied that the slowest operation is speeded up to the limit, then find out if the remaining presses are manned to agree with the slowest press.

Here is where most of us fall down. If a press is capable of making 350 stampings an hour, and it takes five men to work it at this speed, we are prone to put on the five men. A little thought will convince anybody that if the key press can only make 160 stampings per hour there is no use of manning the other presses to a production point beyond the slowest press. That is important. It is invariably overlooked. The thing to do is to put on just enough men to keep in time with the slowest press. Instead of five men, it generally turns out to be about three.

Having reached the point where we are sure that the presses are manned to correspond with the slowest operation, we are ready to refine further. We will suppose that the lineup is running, and that we are studying it right on the job. We find that there are always idle men in the lineup at periods. They may be waiting for the preceding operation. They may be exceptionally fast operators or they may be waiting for trucks. There will be a hundred reasons why they are idle, but there isn't a single good one.

A common condition in press shops is to see two men take a stamping off a press and hand it to two other men who carry it to the next press while the first two men lean back and wait for their press to hatch another stamping. There is no reason why the first two men, if they have time, can't carry the piece to the second press, put it in and pull the lever. A mechanical or automatic kickout will stop the press after one stroke. Other men can take the stamping off.

A Steady Pace

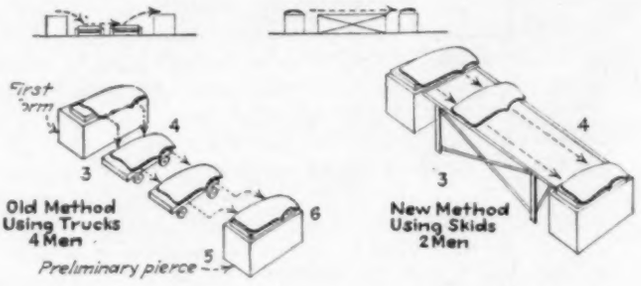
The ideal to keep in mind is to so adjust personnel and conditions in the lineup that everyone in it is working continuously. Not racing, but keeping a steady pace. If it is necessary to have an operator working on three presses alternately in order to approach more closely the ideal, by all means instruct him to do just that. When satisfied that the operators are working right, ask yourself if any new equipment will help the operation.

Perhaps the men are putting the stampings on trucks, and are shifting the trucks between presses when tables or metal skids covered with old air hose to protect the stampings would facilitate matters. Perhaps a roller conveyor is needed to slide the stampings to the next press. Or, if the stampings are taken away to be annealed, perhaps it will pay to construct an annealing table and introduce it into the lineup. When satisfied that everything in the way of equipment has had consideration, then find out if die changes will help.

Perhaps the scrap from the trimming dies is coming off in unwieldly pieces. Maybe scrap cutters will help. Perhaps two or more operations can be combined in one die, and several operations eliminated. Perhaps spud points could advantageously be changed to punches, or vice versa. Perhaps two dies or more can be set on one press.

The distance that a man has to walk from one operation to another should be cut to the minimum. Careful study of the placing of the smaller presses is always productive of good results. If the lineup is to be semi-permanent it may even pay to move some of the large presses. The last question to be considered is: Are all factors being co-ordinated to the desired end?

For instance, is the first press fed steadily? If the crane is required to lift the loads, does it anticipate the wants of the operators and have a load ready for them? Are the truckers placing the scrap trucks at just the right point? Is lubricant supplied, or does the whole lineup wait while a man closes it up? Are the men placed properly—that is, is there a six-footer doing a job that a short man should be doing, or vice versa? Do the operators wipe out the dies in their spare time? They should. Are the trimming dies cutting cleanly or do the operators have to use bars to get the scrap out? Are the inspectors continually stopping operations for micro-



scopical flaws? Is the metal tearing? All these points require constant attention or they will get beyond bounds.

There are many other points. The major ones are listed above. If they are followed, the results will be surprising. With them as a guide we will look at their operation in actual practice.

As an example we will take the side panel of a Dodge sedan. It may be either right or left, but it is a one-piece stamping and is made in a lineup of eleven presses. This lineup had been running for several years, and had been carefully studied by the rate setting department. There were a total of forty men working on it. After a little further analysis this was reduced to thirty men.

In studying this lineup we found that the first operation was the slowest one. This is seldom the case, but it occurred here. The reason for it was that the first press is a large "double-acter" and makes a 12-in. drawing operation. Speeding it up further, tears the metal. The steel men have been working on it for a long time, and have found no answer. We have to content ourselves with its present speed, for the time being at least.

Skid Rails Replace Truck

There are two men in front of the press feeding it. The blanks weigh more than ninety pounds so we cannot eliminate either of these men. Behind the press two men take the stamping off and lay it on a truck. Two other men pick it up and place it in the second press. After some study, we take out the truck and put in a pair of skid rails connecting the presses. Numbers 3 and 4 now take the stamping from the first press, pull it out on the skids, slide it over to the second press, and place it in. No. 3 pulls the lever of the second press. We install an automatic kickout so that the press will stop of its own accord. Numbers 5 and 6 on the old lineup are eliminated.

Behind the second press, two men take the stamping off and place it on a truck. After a while, Nos. 9 and 10, (on the old lineup), bring an empty truck and pull away the loaded truck to the next press. The distance

between these presses and the impracticability of moving them closer prevents us from doing anything here. We move behind the second forming press. Here we have a complicated motion that is rather difficult to follow. Numbers 11 and 12, (on the old lineup), take the stamping off the second forming press and start to carry it to the roof-notching press which is placed half way to the final trim die. On their way to this press they are met by No. 13 who relieves 12 of his end of the burden. Nos. 11 and 13 carry the piece to the roof-notching die and then over to the truck where Nos. 14 and 15 take it from them. No. 13 seems to have been put there to give No. 12 a rest for no apparent reason. We take No. 13 out and let No. 12 continue over to the roof-notching die, assuming No. 13's duties. It works fine, so we do away with No. 13.

Behind the final trim die Nos. 16 and 17 take off the stamping and place it on the annealing table. The stamping stays on the table twelve seconds—the time necessary to properly anneal the window and door corners. Nos. 18 and 19 take the stamping off the table and place it on a truck. Nos. 16 and 17 have considerable trouble stripping the scrap from the back of the final trim press. We have the machinists make certain changes on the die which make the scrap strip easier. Then we have Nos. 16 and 17 not only place the stamping on the annealing table, but also take it off. Occasionally the operator in front has to wait for these men, but that is of little consequence, because the press is faster than the key press, anyway. We, therefore permanently do away with Nos. 18 and 19.

From Forty to Thirty

In studying the next group we find that No. 29's sole duties are to push the end of the stamping down on the press. The dies are tight. A block of rubber takes this man's place, and we eliminate him. Behind the third forming die we find seven men working on four presses. Nos. 22 and 23 take off the stamping and hand it to Nos. 24 and 25. After it is hit on the roof-notching die, No. 25, and No. 28 who come over to help, carry it to the finger die while No. 24 waits at the press. We eliminate No. 28 and find that things go on just about as before.

The last two dies are very fast—much faster than the key press. There are seven men working between these presses. Each press has a man, Nos. 34 and 37 who, after the stamping has been hit on the first die, pick up their end of it and, aided by a man on the other side of the press, lift the stamping to the next die. We take those men out, and find that the operation is somewhat slowed down. This is immaterial because it is still much faster than the key press. We find that No. 37 is used to shuttle the stamping between the presses. We remove him. We are still faster than the key press.

We started out with forty men, and we now have thirty without having affected the net production of the lineup. We have slowed down individual operations, but the men we have left are working steadier than they did before. Our savings in labor cost amount to about $60 a shift or about $50 per thousand stampings. If we make 200,000 bodies from those dies we shall effect a net saving in labor of about $20,000.

In this particular lineup there are about eight more men still on it that can eventually be eliminated. It has been carried far enough, though, to illustrate the principles of analysis, and the value of their application.

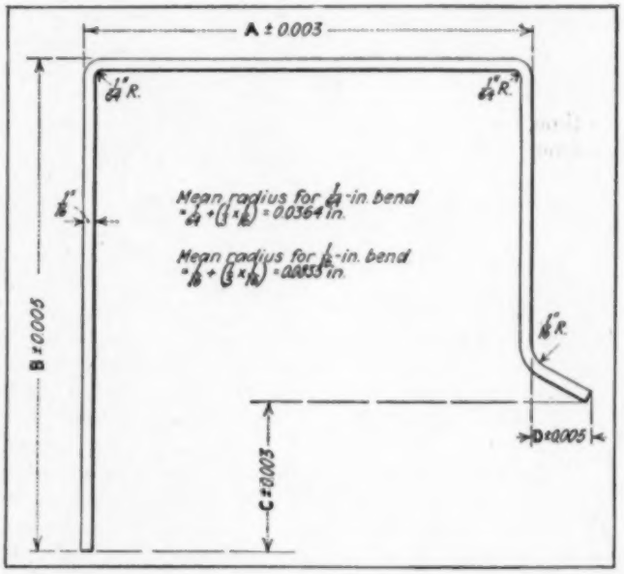
How Steel Bends—*Discussion*

HENRY W. BOEHLY
Machine Designer,
Mergenthaler Linotype Company

RECENTLY I had an interesting experience in determining the lengths of blanks that were to be bent. After being bent to the final shape, the parts were to have the dimensions called for on the drawing, without trimming or further working.

We had to make a quantity of parts of the type shown in the illustration. The material was $\frac{1}{16}$-in. machine steel $\frac{7}{16}$ in. wide. We found that when the length of the arcs at the bends were figured from a mean radius equal to the radius of the inside of the bend, plus one-half the thickness of the material, as is usually the practice, the allowance was too great, and it was necessary to trim the ends of the pieces.

In experimenting, it was found that by adding one-third of the thickness of the material to the radius at the inside of the bend as the mean radius in determining the lengths of the arcs, we obtained the best results, and



that in each one of the pieces the dimensions were so correct as not to require any trimming.

Since the parts were of various widths at the dimension *A*, it was necessary to provide bending blocks of different widths. Instead of making a lot of blocks, we made a block to bend the pieces having the greatest width at *A*. After all the pieces of this width had been bent, the block was machined for the pieces of the next smaller size, and so on through the different sizes. By this method, but one original block was required, thus saving considerable expense.

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In heating almost any large piece of steel for forging, the rate of heat absorption has been found to be $\frac{1}{8}$ in. on each side per 5 min. of heating time. This rough and ready rule, however, does not hold good for small pieces, rods, and the like.

EXECUTIVE FORUM

Promising Performance

FRANK WALLACE, Sales Manager of the Viking Tool Company, took his job seriously. When he set out to land an order, he displayed a certain nervous enthusiasm until the deal was closed. Knowing this trait in his junior executive, Donald M. Graham, Viking's president, could see that Wallace had something on his mind when he entered the office.

"I've just gotten back from Columbus," said Wallace. "I saw the Power Pump Company about our quotation for six turret lathes. Their shop men like our design, and our price seems to be in line. In fact, I thought I had the order in the bag when I ran against a snag. They want us to guarantee these machines. I was tempted to agree just to close the deal, but I knew you'd want to be consulted on any change in policy.

"What do they want us to guarantee?" Graham asked.

"The machines are to be used on valve bonnets," Wallace explained. "We made a time estimate on machining these parts. Now their works manager wants a written guarantee that these estimates will be met in every day shop practice. Since this seems to be the only question between us and the order, I think we should comply with this request."

Graham frowned thoughtfully. "You're treading on dangerous ground, Wallace. Factors other than machine tool design affect production. The operator's skill, the method of wage payment, the uniformity of material, shop service, and other conditions must all be considered. How can we assume full responsibility for their output when we only contribute to one phase?"

"We must consider existing conditions," said Wallace. "If Power Pump were an antiquated outfit I wouldn't touch the proposition. But we know their shop is up-to-date and their management is progressive. Their operators are skilled and well paid. They'll easily be able to equal or better our estimate. As makers of these machines, we should be able to gage their capacity under a given set of conditions and to stand back of our judgment."

"But these conditions are variables," said Graham. "Suppose they lose their best operators and put green men on the machines. A buyer should be content with the maker's reputation and the previous performance of his products. These people have used our machines before and know we'll make good on any defect in workmanship or material. What would they expect if the machines failed to meet the time estimates?"

"That's hardly possible," said Wallace, "but if it did happen, we'd make good of course. We'd have to modify the machines until they met the requirements or make some price adjustment. If we could show that the failure was caused by conditions beyond our control they could hardly blame us for the poor results."

"Now you've touched on the sore spot of the entire question," said Graham. "When failure occurs, there's always an argument to fix the responsibility. If you go into a deal like this you've got to be prepared to make good on failure for any cause. Otherwise you get into controversy and possibly litigation. As a result you injure our reputation and eventually wish you'd never touched the job."

"But guarantees are used extensively in other lines of business and by certain machine manufacturers," Wallace pointed out. "We need this order and I don't want to lose it just to maintain a traditional stand."

"The order isn't lost yet," said Graham. "In the long run our trade will have more respect for us if we steer clear of catchpenny sales methods. Sound buyers have no illusions about guaranteed performance."

Suggested by Raymond H. Dauterich, Crescent Engineering Company

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What Do You Think About This Problem?

Guarantees have long been a sales weapon for certain kinds of manufactured goods. In some instances, makers of industrial machinery have followed the trend in this direction and have undertaken to insure the performance of their products. Is this practice a logical development in sales stimulation or is it a potential source of embarrassment for the manufacturer?

. . . Discussion
of Executive Problems

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Brain Fag

If he is interested in his work, a designer or any other mental worker will not find it fatiguing. There are a few designers who think it is necessary to lay back in their chair, take a lot of time loading up a pipe, and smoking whenever they get in a corner, under the belief that they are creative artists and that this relaxation inspires them with brilliant solutions to their problems. A good designer will often find a solution at home after hours and next day go right ahead working on his problem without a lot of fuss or hair pulling. He should expect to have a sluggish brain if he stays up half the night, which should not happen very often.

There are very few plants where the men in the shop are allowed to smoke during working hours, and nearly every mechanic has occasion to set up a working fixture or to figure out a method of holding a job, which is a mild form of designing. A regular designer, who is a few rungs up the ladder from the mechanic in the shop, should not find it necessary to smoke or feel that he should have privileges to do his work.

—U. Seth Eberhardt, *Works Manager, Newark Gear Cutting Machine Company.*

Anticipation Without Realization

When a service bonus has once been awarded it is always expected. A company should announce the discontinuance of any former bonus. From one point of view the men are not entitled to the bonus, but it is rather rough on them not to receive it after years of expectancy. Every company should make the conditions of bonus awards clear, and where awards are given they should be given in the same way as wages; that is, if the worker has fulfilled the essential conditions, he is entitled to it.

—W. E. Warner, *Herts, England.*

One Big Family

Some companies have used an annual picnic for all employees and their families as the means of getting acquainted. This has meant that the executives have mingled and visited with the employees and met their relatives which almost always results in very favorable impressions on both employee and executive. Another plan has been the winter social for all employees at some building capable of housing the gathering. The next morning after one of these parties, the president said, "I didn't realize the fine clean set of men we have in our shops. You know before last night I had never seen them except when they had dirty faces and were wearing greasy clothes. I'll pay for having another of these parties this winter, and next winter I want at least three of them." As the company realizes on the productive results of the better feelings created by these parties, it should foot the bills. Bowling leagues are fine, but here the workman, to many of whom it is a hardship, must pay. Basketball, baseball, and other sports should be helped by company financing to a certain extent.

The greater part of activities with which the personnel director apparently keeps himself busy are of no importance. Company papers are generally filled with childish drivel and justify their existence only when their principal factor is to help sales through advertising the plant to jobbers. Practically all companies which have plunged deep into personnel excesses are now sanely and ruefully counting the cost of their folly. A wise company will be a bit backward in personnel work rather than appear to force its ideas upon the workers. It is far better to give them what they ask for than to give them something they will not appreciate and do not want.

—E. E. Gagnon, *Mechanical Superintendent, Raybestos-Manhattan Company.*

Convenience or Confusion?

For the greater part of my professional life, I have been employed in organizations that have used both the metric and English systems. So far I see little indication that the metric is likely to supplant the English; certainly not as far as mechanisms are concerned. For the more accurate work, which is gaining in volume in this country, the finer divisions of the meter do not serve as well as the finer divisions of the inch. I do not believe that cost has prevented the adoption of the metric system. Total cost is no deterrent in this country when the expense is justified. If genuine economies would result from the adoption of the metric system, it would be certain to be used. It is not prejudice that prevents its use, as prejudice cannot stand in the face of balance sheets; but simply that the benefits claimed for it are theoretical and not actual.

—Douglas L. Parkhurst, *Chief, Instrument Division, U. S. Coast and Geodetic Survey.*

Leveling the Load

The failure of attempts to diminish the violence of seasonal manufacture by manufacturing for stock has been due to a too enthusiastic endeavor to inaugurate the change at one single stroke. Such changes must be evolved gradually with a detailed study of each factor. The first step, and one which often results in a marked indirect saving, is the elimination of odd and special design machinery. This often means that the regular line available in stock will get the call on a sale. This is good business, since most special equipment is built at a loss, if all costs are properly allocated.

The next step is a certain amount of rational standardi-

zation. This is not to be construed as a misguided desire to standardize complete assembled machine models, but only certain component parts common in type to a number of models. This may be divided into two stages, the first dealing with true standard parts, such as bolts, nuts, and washers, which are readily made for stock, but which may often be bought more cheaply from a specialty manufacturer. The second stage deals with parts or subassemblies, peculiar to the machine manufacturer's own product, but which by a certain amount of redesign may be made common to several models or types of machines. If the effort to best slack times is concentrated for the first year on this latter classification, a sane and safe foundation will be laid for the elimination of this recurring evil. Then, as design and production both work to the same ideal, further extension of the basic principles will come logically. —ALBERT HOERSCH.

The Fewer the Higher

In compiling an estimate, the determining factor is labor cost; all other details are fixed and can be arrived at by simple arithmetic. The essential factor therefore should be left to a technical man who is conversant with the plant, the personnel, and methods of production. To endeavor to obtain costs by the use of a percentage is to invite discrepancies between costs and estimates. Such discrepancies are very disturbing and tend to undermine the confidence of the directors, so very essential to an estimating department.

The price to be paid by the customer for spare parts is usually governed by a price list, but where this is not so, the actual cost of production should govern the invoice. As a machine gradually approaches obsolescence, it will be found that the demand for unusual parts increases, and after that stage has been passed parts will still be demanded by customers who continue to use the machine. It is obvious then, that such parts will have to be made by much more expensive methods than formerly, and can only be supplied at a price which shows a profit to the maker. One of the recognized penalties for using obsolete machinery is the excessive cost of replacements. —A. WILLIAMS,
Bristol, England.

Lucky Number?

The thirteen month year is one of the most logical and well thought out calendar reforms. Its merits are beyond reproach. There is just one apparently insurmountable difficulty—to get the world to change its habits and all its printed literature at one single swoop.

While several pre-eminent firms have decided to go it alone, and have already instituted the change, we must not lose sight of the fact that they are big enough to stage a plan that is an excellent source of publicity for them. In fact, it is easily conceivable that within the many ramifications of their far flung organizations, they may even gain enough in internal simplification to nullify much of the added burden on their outside contacts under a dual calendar system. But for the little fellow and the individual, it seems a futile gesture, without an international agreement to back it up and establish a universal change. —DONALD R. WATSON.

Dole or Control?

Industrial depression occurs in cycles. An industrial depression of more than usual magnitude has occurred after each of the recent wars. Unlimited output must bring its period of reaction. The present depression is the backwash of the Great War. Ordinary depressions will recur until those responsible cease to supply a saturated market with goods it cannot absorb. This will only be brought about by a better and closer economic understanding of the international markets.

The day of supplying to demand seems a long way off. Until such times come, national help to relieve unemployment is to be commended because of the seasonable trades. These trades cannot under the present system bear the burden of supporting their workers during lean times. The members of the heavier trades who carry the greatest amount of directly productive labor can only foster such a scheme when that member is an organization of such size and activity that it can budget for its labor a definite period ahead.

Industry does owe something to its workers, and by direct or indirect taxation, it should prepare for the alleviation of unnecessary hardship to them. Our national employment relief has failed because our political leaders did not realize what a canker to industrial prosperity idleness can be. Before introducing measures that tend to destroy the morale of labor, there should have been some attempt to apply this surplus labor to the many development schemes long overdue.

—LEONARD P. COOMBES,
Warwicks Time Stamp Company,
London, England.

Speculating in Personnel

Key men have acquired their status within a concern by virtue of valuable service, specialized knowledge in certain branches of the business, exceptional ability, thoroughness, initiative, and loyalty. A company naturally feels morally obligated to make the position of such men as secure as possible, avoiding layoffs, which in the long run are more expensive than keeping such men on the payroll.

Banks and other financial institutions are compelled to keep a reserve fund to secure the investments of their clients. Would it be unreasonable to suggest a similar procedure for industrial concerns, or is a man's investment of his best years and efforts not worthy of the same or similar consideration?

Before laying off employees—shop or office—every effort should be made to keep the organization intact by careful analysis of the following points, which are given in the order of importance as viewed by the writer:

In times of prosperity resort to:	In times of depression return to:
1. Overtime	1. Normal prices
2. Longer deliveries	2. Quicker deliveries
3. Higher prices	3. Normal working hours
4. Larger working force	4. Normal working force

It will be noted that both the employment and laying off of extra men should be the last resort.

—WILLIAM A. ROSENBERGER,
Assistant Chief Engineer,
Pangborn Corporation.

The CHALLENGE of the MACHINE

Dr. Julius Klein
Assistant Secretary of Commerce

"What is the essential truth? . . . Has the Machine become an ogre, or a devastating metal dragon—ruthlessly devouring jobs, turning us into robots, over-shadowing us with its somber and portentous bulk, breeding a mere callous efficiency, a hard and soul-less skill?
"Or is the machine, on the other hand, really a job-creator, a social benefactor, a more potent business stimulator?"

THE ADVANCE of industry and business throughout the decades and the centuries has been packed full of drama. It has held as many thrills, as much suspense, as keen and vivid conflicts, as any stage portrayal of sentimental love or loss. For instance, those early days of the Industrial Revolution more than a century ago, when ancient, rooted handicrafts were being rudely supplanted by the swift, complex Machine, have formed the subject of exciting narratives. That was a turbulent and fevered age. There was a feeling that the new devices were taking the bread out of workers' mouths and casting them adrift. Anger was blazing high. Riotous clashes engendered a deep and rankling bitterness. Certain machines were smashed—remorselessly demolished—by the violent hands of adherents of the vanishing scheme of things.

But clear-sighted men perceived the immense, far-reaching benefits of the novel, awesome instruments. They counseled moderation. Calmness was restored. The new system got its chance to function and expand. Men, in an ever-growing army, found a living in the factories. At first there were some frightful abuses—hideous cruelties to the workers—but slowly the deep need for true industrial justice began to be more widely felt. Reforms were instituted. The sense of social responsibility gained strength. And so the most astounding material advance in all the history of the world began.

For many long decades the position of the rapidly developing Machine encountered no grave challenge. But lately there have been attacks. The cry has been raised again that machinery is racing ahead too fast—that it is getting "out of hand"—that it is one of the major factors in taking jobs away from men.

Now what is the essential truth? This, we will all agree, is a problem of genuinely towering importance at this very moment. Has the Machine become an ogre, or a devastating metal dragon—ruthlessly devouring jobs, turning us into robots, overshadowing us with its somber and portentous bulk, breeding a mere callous efficiency, a hard and soul-less skill?

Or is the Machine, on the other hand, really a job-creator, a social benefactor, a most potent business-stimulator?

The issue has been joined—and every one of us will do well to ascertain, and study and digest, the facts.

I think that the great majority of level-headed students of this subject view the Machine as a liberator. They see it creating wealth—and not for the few alone. They recognize its prime responsibility for the rise of giant industries concerned with a vast array of new conveniences and comforts. They are grateful to it for lifting much of the age-old burden of grinding labor from the bent backs of the toilers. They conceive of it as the source of unprecedented wage scales.

That, of course—objects the skeptic—may be all right for the worker who has held his job and is operating the machine, but what becomes of his displaced shopmate? Where does the figure in that advancing wage scale? Some observers are sincerely fearful of an impending increase in "technological unemployment"—that is, in the number of men made idle by the introduction or increased efficiency of our machines. Thousands of men, in specific places, have in fact been thus displaced. Their period of shift and change, of temporary bafflement, is apt to be extremely painful and distressing. Privation may result. The need for a more considerate, more concretely helpful attitude, in all such cases is apparent. Society—and, specifically, employers—should aid such men to achieve a new, secure foundation of economic welfare. We cannot shirk that duty; we cannot *afford* to be remiss.

But from the very beginning of the machine age, every such upheaval, despite its temporary stresses or disadvantages, has lifted the masses of the people to heights of well-being previously unattained. And I think we are fully justified in believing that the activities which have ramified endlessly from the new machine-driven industries—the new jobs (especially in the so-called "service occupations") that have been brought into being by higher standards of living—should eventually take care of practically all the men and women displaced by the Machine. New wants, new needs for ever-varied service, sprout with amazing luxuriance from the soil of the Machine Age.

Our official Department of Commerce figures show

A radio talk by Dr. Julius Klein, Assistant Secretary of Commerce, delivered over the coast-to-coast network of the Columbia Broadcasting System from Washington, D. C., 7:45 p.m. Eastern Standard Time, Friday, January 30, 1931.

that there was an increase of 200,000 people employed in factories between 1927 and 1929. If the machine were destroying jobs, that fact would be more evident in factories than elsewhere—yet the percentage of people working in factories is larger than it was either 80 or 20 or *two* years ago.

I find Mr. Franklyn Hobbs, the director of research in an Illinois financial institution, stating as "an unassailable, incontrovertible fact," that the introduction of automatic and labor-saving tools and appliances into the manufacturing industry has *not* reduced the amount of money paid by that industry to labor and has *not* displaced workers in certain industries as rapidly as avenues of employment have been *opened* up to them in *other* industries. [*American Machinist,* Vol. 74, page 193.] "Actually"—this trained statistician tells us—"the machine age has increased employment, increased wages, made work easier, saved lives and limbs, and has enabled the workingman to live in comfort." During the past 30 years (according to these researches which Mr. Hobbs has developed on the basis of our Government figures), time-saving methods and tools have in truth driven two workers out of every three away from a given bench—but they have left the third man drawing just as much pay as the three men had drawn before the tools arrived, and, moreover, the two men were driven from that bench to other benches at an increased wage. That is the broad generalization and conclusion from statistics.

Mr. John T. Flynn (a keen observer), by elaborating one great outstanding example, shows us very clearly just how the thing works out. By putting in more efficient machinery during the past half-dozen years the American automobile industry has greatly increased the number of cars which a given number of men is able to produce. Now, has that advance of the machine swelled the ranks of the unemployed? Quite to the contrary! It has meant better cars at lower prices—a bigger demand in consequence—a boom in the industry which has compelled the manufacturers to put on tens of thousands of new workers for the actual production of the motor vehicles themselves.

The Multiplication of Automobiles Has Multiplied Jobs

And in addition here is an *even bigger* thing, I think—a situation to which I have referred rather often in the past: The vastly increased use of cars (with its ultimate basis largely in labor-saving machinery) has absolutely created—almost out of nothingness, we may say—millions of jobs for the makers and sellers of automobile parts and accessories; for tire workers; workers in metals, in lumber and wood, in textiles, glass, and other raw materials; for freight handlers; motor-car dealers and salesmen; workers in automobile finance and insurance; service and garage men; chauffeurs and drivers of taxis, buses, and trucks; men making gasoline; men employed in building and maintaining good roads; people who build and work in roadside stands and lunchrooms—to say nothing of those who are engaged in making camping outfits, driving gloves, blankets, and all kinds of other motoring equipment. And then, too, there are the benefits to the persons who produce and transport the raw materials for all these things. If it had not been for the wonder-working, labor-saving machinery of the automobile factories, all these millions of other excellent jobs would never have existed. That is the way that most such matters are likely to work out in the complex modern business structure of the present day.

One does feel, to be sure, that the introduction of new machinery should not proceed in a merely reckless, headless manner. There should be a scrupulous regard for the immediate consequences of such action. All the various factors need to be co-ordinated, with sound control and reasoned planning. Social readjustments may ultimately prove necessary, so that we may accommodate ourselves adequately to these triumphs of the machine.

"I think that the great majority of level-headed students of this subject view the Machine as a liberator. They see it creating wealth—and not for the few alone. They recognize its prime responsibility for the rise of giant industries concerned with a vast array of new conveniences and comforth. They are grateful to it for lifting much of the age-old burden of grinding labor from the bent backs of the toilers. They conceive of it as the source of unprecedented wage-scales."

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But the main fact is: They *are* triumphs—there is no gainsaying that. We pay in the United States three times the British wage, four times the German wage, ten or twenty times the Oriental wage. This has found expression in education for all, comfortable living in livable homes, and more recently in an almost endless variety of luxuries or semi-luxuries that have astonished visitors from abroad. Our amazing developments in machinery and "mass production" have riveted the attention of foreigners upon our industrial methods.

Business men in distant lands have found it difficult to explain how it is possible for us to pay the high American wage and at the same time successfully export enormous quantities of manufactured goods, to compete effectively in world markets with the products of low-wage countries. Machinery is the answer. The industries of this country absorb twenty-three dollars worth of machinery per year per capita for our entire population. How much does Britain take? About ten dollars worth. And Germany? Nine dollars. While across the Pacific in China the figure is five cents. American workers earn more, and live better, because the machines available to their hands produce more. In this we have the secret of one of the vital sources from which flow the high American standard of material existence—and the democracy of American culture. Through the use of constantly improved machinery the path to progress lies. Our welfare requires continuing and rapid improvement in production methods, for it is in this way that we have attained, and will be able to maintain, the industrial leadership of the world—with all that means to us, in every aspect of our life.

Please note that word "maintain"—for here we run upon a truly surprising situation, a fact that is very apt to "hit us in the face." Many of us are too prone to think that practically all American machinery is the "last word" in efficiency and perfection of performance. But the facts do not bear that out. Instead of uniformly in the vanguard, many of our factories are actually falling behind the procession—failing to keep step as they should

with the progress of inventive genius and engineering achievement. No good can come of that.

In recent years machinery designers have been showing marcelous progress in the development of their designs. In the year 1930 alone, machine-tool builders announced over a thousand improvements—and these improvements are so outstanding that many a machine becomes too expensive to operate long before it is worn out. Take just one of numerous cases that have come recently to my attention. Six machines were ordered for a certain operation in manufacture. Before they were delivered a better design had been developed. These machines were actually obsolete before they could be put to work. What did the management do? Was it "penny-wise and pound-foolish"? Did it try to "make shift for a while" with the inferior equipment? No. This firm had both courage and true wisdom; it paid the bill, quietly scrapped the six machines, and replaced them with the better types.

The Surveys of 1925 and 1930

My friend, Mr. Condit, and his associates of the *American Machinist* magazine, studied the metal-working equipment in our machine shops in 1925. They discovered that 44 per cent of all this metal-working machinery was more than ten years old—which is the same thing as saying that on the average it was out of date. It was obsolete because practically every type of machine tool had been redesigned within that period, and each new design represented a signal advance over its predecessor.

A similar inventory was taken by this same publication in 1930. And what was the result? A highly disturbing fact—the fact that at this later date no less than 48 per cent of all this machinery was obsolete—4 per cent worse than the condition five years previous. Although this 1930 survey by the *American Machinist* has to do only with equipment in metal-working plants, there is reason to believe that a parallel situation exists in other factories producing other types of commodities.

This brings most of us up "with a start," and there is cause here for concern. There is surely no justification for retaining in American factories machinery which is undeniably antiquated—which does not do its job properly—which works slowly or clumsily in comparison with newer types. That can mean nothing but hampering, cluttering waste. It impedes the smooth flow of progress. It tends to throttle competitive ability. The resulting losses and disadvantages are much more likely to react unfavorably upon the interests of American labor as a whole than would the introduction of new equipment of the modern and effective types. Economical production will work to the advantage of every class and element in our economic life.

Just at this time when industries abroad are waking up, when managers in Europe are equipping their plants with the best machinery they can find—huge quantities going from the United States for this purpose—many American manufacturers appear to be drifting into a dangerous situation where their factory equipment is relatively less effective. If this mistaken policy should be followed for some years, they can expect but one result: the awakening will come when vast sums will be needed for the rehabilitation of this equipment—and possibly under those circumstances they will not have the resources essential for that purpose.

The *American Machinist* survey brought out some significant facts about the degree to which machinery obsolescence exists in the various industries. Naturally, the percentage is smallest in the newer industries like the aircraft group. But with respect to the factories turning out agricultural implements, engines and waterwheels, construction machinery, and woodworking machinery, it is certainly disconcerting to find that more than half of the equipment employed to produce these articles is unmistakably out of date—while typewriter makers and railroad repair shops have as high as 73 per cent of obsolete equipment.

The figures by geographical districts are enlightening, also. In New England we find an obsolescence percentage of 62—in New York and New Jersey 44—in the States around Chicago 40—while in the Pacific Coast 39 per cent of the machinery appears to be out of date. I have not mentioned all the regions, of course—but isn't it rather interesting to see how the percentage of obsolescence drops as you go across the country?

I cannot emphasize too strongly that it is shortsighted to permit any halt in our engineering and production. Better, far, to stimulate our machinery of marketing and distribution! There is the real source of most of our present business difficulty—flagrant, preventable waste through slipshod selling methods.

"Half of our production equipment ought to be replaced by modern machinery, because this recent survey has proved it to be obsolete. [*American Machinist* 1930 Inventory.] The sooner we replace it the better . . . If the machinery factories are set busily whirring on this greatly needed work, it will be another factor operating to pull us out of the depression. It would form a highly worth-while element in unemployment relief. More business would be thus engendered; more jobs would be created."

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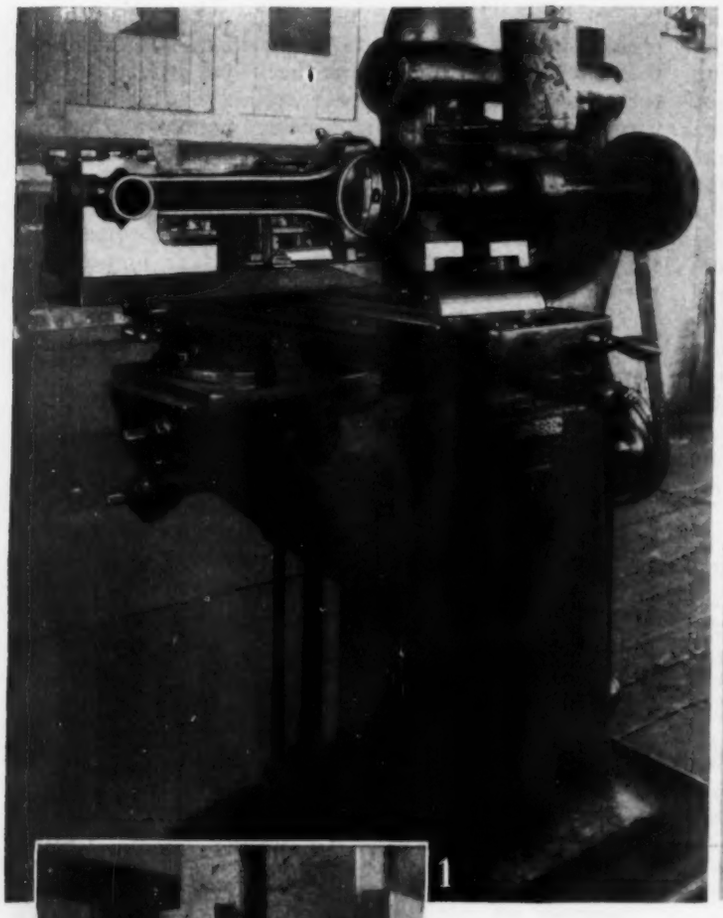
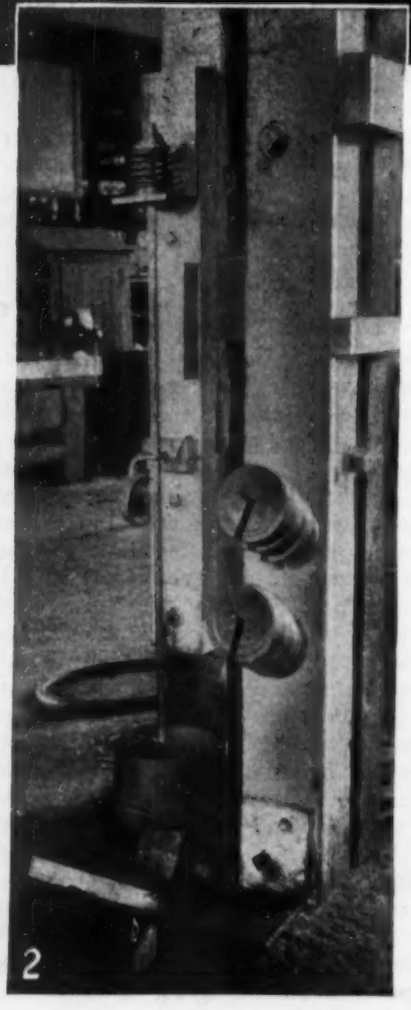
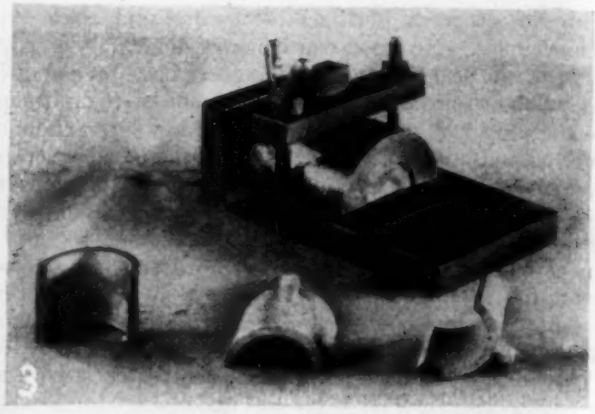
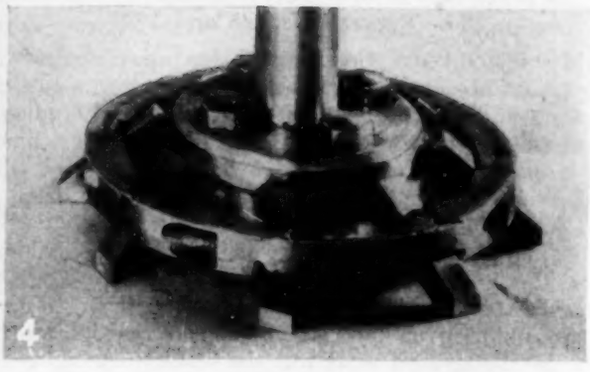
Half of our production equipment ought to be replaced by modern machinery, because this recent survey has proved it to be obsolete. [*American Machinist* 1930 Inventory.] The sooner we replace it the better. . . . Such replacement can be made far more easily in dull times. Now is an especially advantageous time to buy machinery. The cost of materials is low. Manufacturers can give the very closest attention to orders, assuring the best in quality, workmanship, and servicing. If the machinery factories are set busily whirring on this greatly needed work, it will be another factor operating to pull us out of the depression. It will form a highly worth-while element in unemployment relief. More business would be thus engendered; more jobs created.

Let us make sure that our replacements of machinery are so managed that no hardship comes to any human being. It can be done. It has been done. It is part of the "challenge of the machine," which we must gird ourselves to meet. All that is necessary is an understanding of the fine balance of all the phases of our manufacturing activity and sedulous thought and care that none of them be injured, none of them displaced. Americans can solve this problem—and in solving it can advance to new, more splendid heights.









RAIL MOTOR CAR ON THE

[1] Facing off connecting rod shells and subsequent boring of the rod bearings is performed on a small milling machine. The shell is held in position by a semi-cylindrical block with angle clamps which fit over the shoulders on either side of the rod head. The rod end is adjusted for height by a wedge which forms an integral part of the supporting fixture

[2] Valve springs are tested by the dead-weight method, weights being hung on the rod until the required compressed height is obtained. The slotted step collar of the testing unit, together with the foot treadle which supports the weights while springs are being changed, both make for rapid operation

[3] A camshaft bearing babbitting jig is used since bronze bearings have been replaced by babbitted ones. No machining of the cast shells is required because of the accuracy of the jig

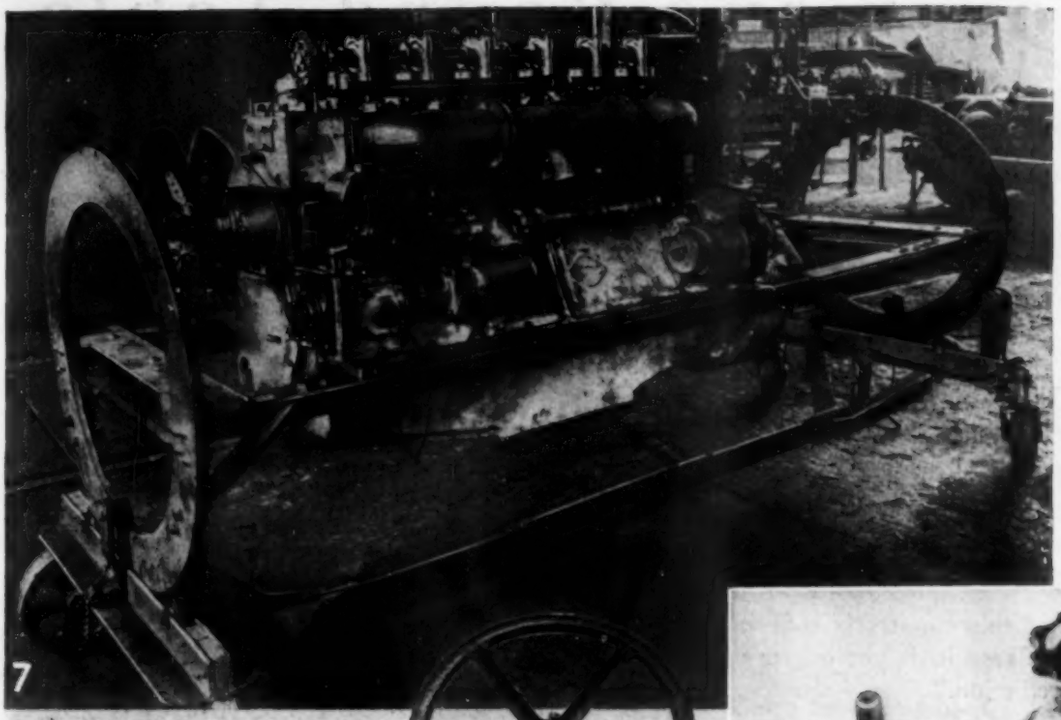
[4] Connecting rod shells are faced off with a multiple-bladed cutter

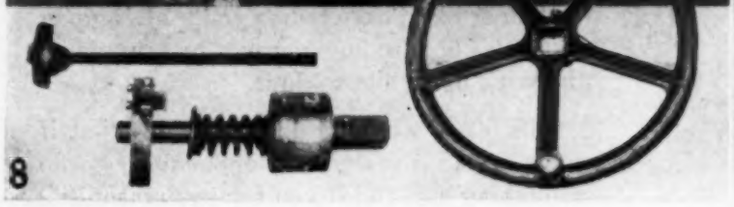
[5] Valve seating and guide reaming are handled by a special tool which permits accurate alignment of the seat with the guide through a ball joint in the pilot guide holder. The slotted arm of the tool allows the facing head to reach all four valve seats in a single set-up

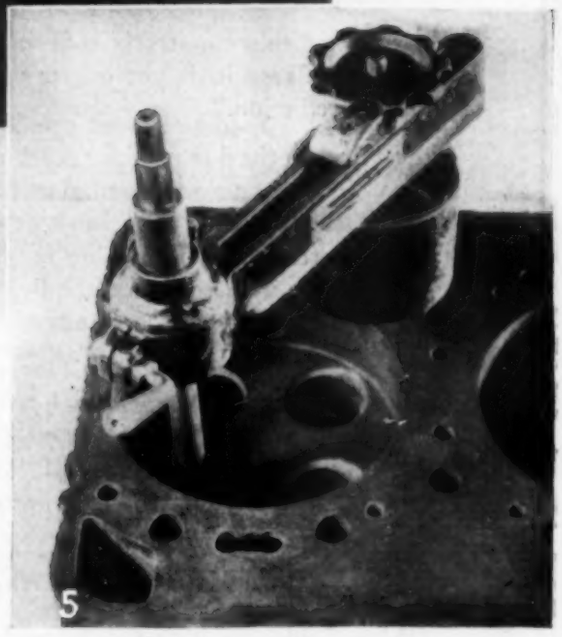
[6] Welding up of worn-out valve seats and broken cylinder heads has been found successful and economical. The heads must be preheated to avoid warping, and machining must, of course, be carefully done

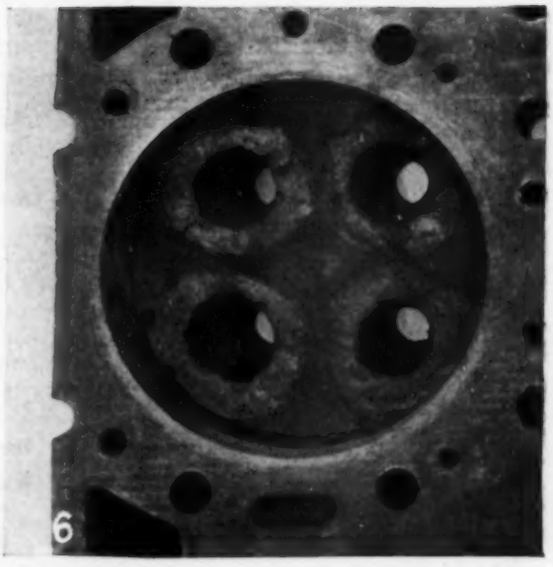
[7] A revolving engine re-building stand permits convenient and comfortable positioning of the engine, no matter what part is being worked upon

[8] Rod bearings are faced and fitted with another special tool. The mandrel is expanded into the bearing with the scraper-like tool at top left, while the rod is held in a bench vise. The springs are then compressed and the cutter head tightened on the shaft with the tool against the bearing cheek. The tool will cut the fillet and face the cheek rapidly and accurately









REPAIRS NEW HAVEN—I

E. O. WHITFIELD

Supervisor, Rail Car Maintenance and Inspection, New Haven Railroad

DIFFICULTY has been experienced by many railroads in the development of proper tools and appliances for heavy repairing of the large types of internal combustion equipment used in rail motor cars. This development, still in its infancy, presents a real problem, the solution of which is vital in its effect on availability of equipment and cost of maintenance.

The New Haven Railroad found it necessary to develop a highly specialized organization at the New Haven (Conn.) shops, completely equipped to repair these engines with the assurance that the requisite accuracy would be attained. This requires not only precise instruments and testing equipment, but careful supervision and encouragement to the shop force in its efforts to improve existing equipment. Tools and appliances thus developed, and here pictured, show decided originality.

The Foreman's Round Table

TRYING HIS WINGS

"TOP of the morning to you," hailed Ed as he answered the honking of Al's horn. "Glad you can find time again to drop by."

"Well, I'm not as busy since the holidays as I expected to be. That revival that was predicted for the first of the vear doesn't show much signs of arriving."

"No, what this country is suffering from just now, as I see it, is not overproduction, but over-prediction."

"Yes, I've noticed that, Ed. A lot of men have said a lot of things that haven't helped their reputations any. You can't get something for nothing without paying for it some time, any more than you can run bills without paying. We haven't begun to pay yet."

"Speaking of bills, Al, I met Harry Shaw down town Saturday night and he told me that he had closed his machine shop and was around trying to collect some of his bills. Looks to me like Harry had a pretty raw deal."

"What calls forth that last remark?"

"Well, didn't his boss get him to quit a good job and start in business for himself, and why? Just to let Harry buy some equipment that he didn't want to buy himself, and that he didn't have room for anyway."

"Right, so far, and what next?"

"Didn't Harry mortgage his house and borrow all he could rake and scrape, and even get credit beside on some of his machinery? And now he is closed down. Isn't that a raw deal?"

"Maybe, but it's a raw deal that I have been hoping for all my life. That's why I don't go after a bigger job."

"Maybe so. Every foreman has that idea. But to get someone into a mess like that and then desert him is pretty raw."

"How does Harry himself feel about it, Ed?"

"'Bout like I been telling you. He's going to ask his boss to buy him out, he says, and I think it's up to him to do it."

"In other words, Ed, you believe that if some friend gives you an opportunity to do something big, and if you for any reason fail to make good, it's the fault of the friend for giving you the opportunity and therefore he should reimburse you. Is that it?"

"No, I don't mean that. I mean that if it's a company that gets you to start, and then you fail because that company takes its work away from you, it's up to them to take the place off your hands at least."

"You're wrong, Ed. About 90 per cent of the people that enter business fail. It is industry's way of getting rid of the weak and the incompetent. Harry is yellow, and he would have failed ultimately anyway. Little shops live on the waste of big shops, and they must expect to be the first to close and the last to open. But, even so, I will take my chance when it offers."

Is it wise, or even ethical, to help or advise a mechanic or foreman to go into business for himself? How far does the responsibility of the adviser extend?

▸ ▸ ▸ Discussion of Former Topics

Mechanized

Modern machinery may have a lot to do with the present-day unemployment situation as it has had in the past, but who wants to discard modern machinery and go back to hand work? It would mean ten to twelve hours a day of hard work at lower wages. It would mean that we would have to walk to and from work or ride the old fashioned bicycle. And what about improvements in the home? Wouldn't it mean that our wives and mothers would have to go back to the old fashioned wash board and have to cook over a red hot stove during the summer months as well as the winter?

We laugh at the crude tools of the past generations, yet we blame modern improvements for our own business troubles. Years ago machinists worked ten to twelve hours a day for less money than we now get for eight hours work. True the cost of living was lower in those days, but let us not forget that the standard of living was also lower. There is no comparison between living conditions in those days and present-day conditions.

—W. J. Owens, *Foreman, Newport Rolling Mill Company.*

The Wail of the Weak?

In the main, Al's boss was right about all of his errors. System is not definite control, but a recognized method of procedure, merely a tool or means of getting the work done in an orderly manner.

Co-ordination is not arbitrating between two or more contesting factions but the organizing or welding of the several divisions of the organization into an effective whole for efficient productive effort. Co-operation is generally taken to mean helping someone else get his work done on time or doing it for him. The best way to co-operate is for each one to do his own work fully in every way. Each division of the organization has certain specific things to do in a certain way. They should perform their several duties strictly to or beyond the required mark without expecting aid from someone else.

—L. O. Brown.

The Fortune Teller

From an examination of some five hundred applications for mechanical positions, I have been unable to determine any relation between the way a man answers the usual application questions and his ability to do a first-class machine job in a reasonable time.

This has confirmed my belief that mental alertness is not necessary in the type of man required for the ordinary machine job, such as drill hands, lathe hands, etc. In the case of tool and die makers this is not true.

We do use a rough form of mechanical aptitude test, such as showing a man a blueprint and asking him how he would machine it completely, or how he would set up a machine and the sequence of operations he would use.

It has been our experience that the only way to find out whether a man is really going to be able to do the work satisfactorily is to put him to work for a week. However, every effort is made in advance of hiring to see that the man is the right type to harmonize with his fellow workmen and is experienced at his trade.

A limited number of tests, properly conducted, will help cut down the number of square pegs in round holes, but if you turn down applicants for machine jobs because of poor results in mental alertness tests, you will have a lot of bright young men in your shop, but not so many first-class workmen.

—W. A. Walter.

Check and Double Check

It is well known that the owner of a poorly equipped machine shop finds it hard to compete with the shop having good, up-to-date equipment. The same principle applies to the mechanic's personal tool kit.

I have found through my own experience that it does not pay to use old tools or old micrometers whose accuracy has been impaired through long use. They may be retained for measuring work that does not require a high degree of accuracy, but it is well to have a new "mike" in the kit, and know you are right when the close job comes along.

Many scales in use today are 20 or 30 years old, and require a tremendous strain on the eyes to read the graduations. Such tools are a detriment to the workman, because the eye strain costs many times the price of a new tool.

—Chas. Homewood.

Check and Double Check

For a turner or planer to keep tools by him is undoubtedly best for himself and for the firm. It means a great weight of steel distributed over the entire works, but this is unavoidable and must be considered part of the upkeep cost. Checking out from the tool-room will prove false economy and a continual source of hindrance to workers. Without tools at a man's hand, production costs will mount.

To keep a list of each man's tools is another matter and is quite good practice. If done properly this will prevent much of the present duplication and loss. I have known men to have six or eight heavy tools of each type in reserve, some in the cupboard, some hidden. Hundreds of tools are hidden, and are only found again by accident. Others are buried in the beds of lathes and covered by turnings. All this shows that periodical checking is necessary.

One seldom finds drills checked out to a regular driller. He is allowed to keep ordinary sizes by him, which is the

best and most economical way. Only special drills or tools, used occasionally, are loaned out by check.

When one tool-room answers for a whole works, the trouble invariably presents itself. To obviate this each department should have its own set of regular tools as far as possible, borrowing being discouraged. There should always be one of each tool in the tool-room for emergency use. With anything continually in demand it pays, notwithstanding cost, to have one in each section. I have seen enough running about and waiting to pay the cost of a tool in less than a year. Small electric portable drills, much used in some works, are a typical instance. Parsimony does not pay, yet it is a weakness with many firms.

—WILLIAM BRYCE, *Sheffield, England.*

The End of the Road

I would suggest that the following plan be followed: When a man is hired, let the employment examiner give him a psychological executive test as well as the usual industrial aptitude tests. When a vacancy occurs, the man whose test shows him to have the greatest ability and who fills the next job below is the logical person to be considered. Consultation of the production department records will give an unbiased view of the worker's achievements. I would permit the personnel section to handle the matter up to this point. The works-manager would have the final word in okaying promotions to executive positions.

In jobs lower than those of executives, good aptitude tests plus ability at his assigned work would qualify a man to go forward. In lower jobs, I think that the personnel section should have the entire authority to O.K. or refuse a promotion.

Seniority must be considered. The oldest employee would be advanced until his records showed him to be unsuccessful at a position. The man next in line would be raised to the position of the man who had failed. The man who had been unsuccessful would drop into the position vacated by his successor.

I think that such a system would keep the incentive of promotion strong while weeding out men who are at "the end of the road." —W. G. BARTHOLOMAY, II.

Sauce for the Goose

It has always been considered that the responsibility of the engineering department should end with the sending of drawings to the shop, but this has frequently failed in practice. A systematic inspection of the finished product to determine whether it is made to the drawing is only to make sure that the shop has done the work correctly and is, therefore, a function of the shop. The engineers, however, are interested in verifying the design and should be permitted to examine the product in its final form to be assured that the desired result has been attained. They need to approve only the first lot of a certain design with the assurance that the shop will take the responsibility of making each succeeding lot a duplicate of the first. The failure of this plan has been due to local conditions such as the desire of the shop to avoid responsibility, or lack of faith on the part of the engineers.

The control of raw and purchased material by the purchasing department has generally worked out well, not only because it fixes responsibility, but also because it makes the work of the purchasing agent easier by allowing him to look further ahead. A complication arises when a plant has certain departments which manufacture material similar to that which may be purchased. For instance, a factory which uses a considerable quantity of steel may find it advisable to maintain a rolling mill for producing some sizes while others are purchased. The control of such material by the purchasing department is possible but rather difficult. No rule can be made for this. Generally it depends upon the ratio of the amount purchased to that produced internally.

Production planning, or scheduling, is entirely a shop problem and should be controlled by the shop. In fact, a production manager will find that he has more direct power as assistant superintendent. Including the finished stores in this work is analogous to putting the control of purchased stores under the purchasing department, and has been found to work out just as successfully.

The fundamental principle in all these questions is the fixing of responsibility upon those in the best position to carry it. —HARRISON G. BROWN,
Supervisor of Standards Division,
Crompton & Knowles Loom Works.

The Fortune Teller

Employers are beginning to look on their bill for labor, the payroll, as something which needs scientific study and investigation. The problem has been attacked in various ways, all of which have their place and some elements of good, but none of which is a cure-all for rising costs of production. Among these methods the one which has caused more criticism than almost any other, and yet which has greater possibilities, even though they may not yet have been realized, is the psychological test.

Since such tests, in order to be scientific, must be impersonal, there is danger that the results of the tests will be used without being tempered by other considerations. The fact that a man does not pass with flying colors may be due to worry about money matters, or sickness in the family, or any one of a great number of causes, all of which should be eliminated or allowed for.

Many of our labor troubles come from placing men of low mentality in places where they are not under close supervision. Such men have excellent opportunities to spread discontent and provoke trouble. So, even in such simple jobs, it is wise to have sufficient tests to determine whether the man's reactions are normal or not. But even out of such surroundings many capable men have arisen. It is worth while, therefore, to know whether there is concealed in this group any material which it would be profitable to train. At the other extreme is the group of men who are hired with the intention of making them into minor executives, of deliberately training them for important positions. If there is any one place where these tests should be indispensible, it is in connection with this group.

Psychological tests will not enable the employer to hire his men for any less money. In fact, it may enable him to select the cream of the offerings and thus make it wise for him to give higher rates than usual for the sake of holding them. —ALFRED LOEFFLER,
U. S. Rubber Co.

What Will Your Inventory Show?

Discussion

"Why will banks lend money on inventory statements, when the statement of the inventory itself may be the necessity for a loan?"

D. C. WRIGHT

I HAVE READ with interest and appreciation the article under the above title, by Chester B. Lord, appearing in Vol. 73, page 951, of *American Machinist*, and my general impression would be that it should be reprinted, set off perhaps with one or two simple tabulations or charts to illustrate in easily interpretable form the out-of-balance conditions shown by some of the case illustrations, and then mailed to members of the banking fraternity.

Any criticism, which the writer might make with reference to the various conclusions or principles set forth would be entirely a matter of detail. I wish, rather, to register a loud "Amen," when confronted with the query raised, "Why will banks lend money on inventory statements, when the statement of the inventory itself may be the necessity for a loan?"

Also, let me not fail to applaud the criticism of the ordinary method of inventory reduction which finds expression in a frenzied curtailment of everything, whether needed or not, during the last couple of months in a fiscal year in order to attempt a superficial correction of the cumulative errors of the prior months.

The practical criticism of an article like this is similar to the plaint of a hard-working ministerial friend of mine, who, in criticising the value of his mid-week services, stated that his only congregation at such affairs consisted of "sermon-hardened-saints" who presumably had small need of the instructions and exhortations that he might put forward at such times.

While those of us who read the article may differ with him in minor details, the general ideas advanced by Mr. Lord are so thoroughly in line with good management and accounting that they can arouse little but agreement in the minds of most readers.

On the other hand, there is a big group with whom industry has to deal that needs to give serious heed to such practical ideas as those presented in the article reviewed, but who never under ordinary circumstances are confronted with them.

In the light of some twenty-odd years of practical industrial experience, the writer has been impressed with the utter lack of shop sense exhibited by the average bank supplying industrial loans. Gradually a few of the larger institutions have apparently come to realize their own weaknesses in this respect and have built up industrial engineering staffs within their own organizations, but for the most part dependence is placed entirely upon occasional operating statements, prepared by the firm seeking the loan, and certified often after a mere cursory check by some outside firm of auditors.

The chief items in these operating statements upon which stress is laid seem to be those referring to inventories, surplus and appraisal values; yet no three are more capable of leading one astray.

As I write, I have before me the neatly prepared annual report of a large corporation, rated as a leader in its field, operating sizeable plants and employing upwards of 6,000 people in normal times.

In this report are allusions to the flattering condition of its finances, as shown in the balance sheet, the inference being that an item listed as undivided surplus and amounting to something over $6,000,000 is something that should encourage every stockholder to rally around the administration for another fiscal year.

Actually, the writer has occasion to know, the $6,000,000 is non-existent, being merely the cumulative effect of some years of improper accounting.

Contained in this same report is another item of several millions of dollars in fixed assets, which may or may not be correct as regards real estate and plant structure. It certainly is miles away from the truth in the matter of equipment, inasmuch as an appraisal figure for replacement values has been used, whereas, this industry being a highly changeable one as regards the public demand for its products, the equipment, which may have cost large sums to provide and which today stands on the floor in top-notch mechanical condition, might conceivably be, and in fact is, as obsolete as the horse car and possessed of less-than-junk value in many items.

As for the inventory items, they are as far from a balanced minimum as the worst of the illustrations cited in Mr. Lord's article.

Yet in all seriousness, I have had interested bankers accept these figures and tell me how high was the "book value" of the stock when figured on the basis of these items.

So, let me again commend the intelligent setting forth of inventory weaknesses and urge the fostering of a campaign, object of which will be to place the perfectly obvious weaknesses of the ordinary operating reports before the group who actually use them as a basis for action.

Industrial engineers and executives cannot help but have their vision cleared and focused by articles of this nature, but being human these people are prone to ignore such things if they are permitted to do so. The real value will be returned through the channels of finance, from whence will inevitably come the pressure to force attention in the operating end.

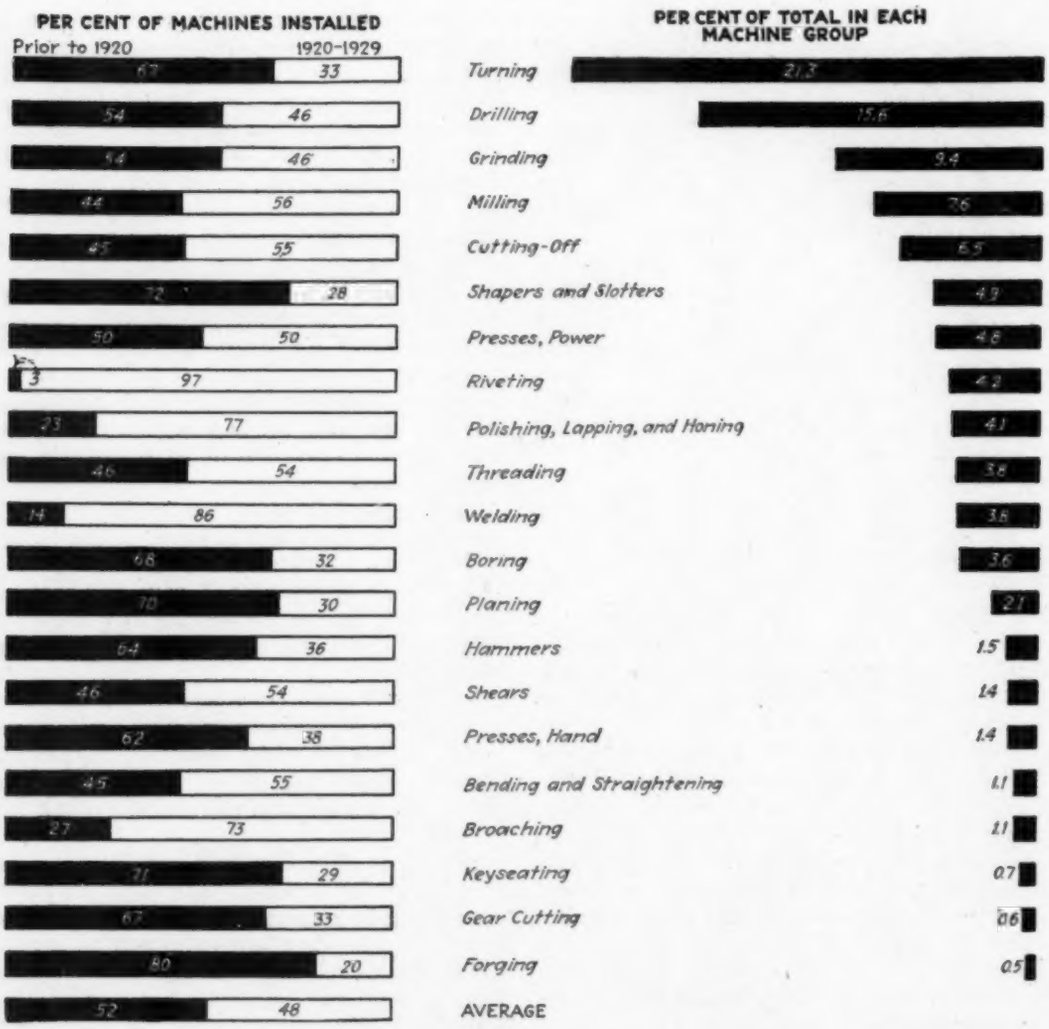
AMERICAN MACHINIST 1930 INVENTORY

of Metal-Working Equipment

THIS group should not be confused with Report No. 15 published in Vol. 73, page 821, which covered foundry equipment in industrial plants. The Census of Manufacturers defines the foundry as an establishment in which metal is cast into various shapes, and the machine shop an establishment in which work is done by means of power-driven tools. A great deal of overlap occurs between these classifications. Most concerns having founding as their principal business do a certain amount of machine shop work. In the aggregate, the total number of machine tools so employed is considerable as indicated by almost nineteen thousand units shown in this report.

Report No. 24—Machine Tools in Foundries

The 56 per cent of equipment over ten years of age is considerably above the 44 per cent shown for all industrial divisions in 1925. Foundries were not reported separately in the inventory taken five years ago so a direct comparison cannot be made. The types of machine tools are well distributed, turning and drilling machines predominating.



Machine Tools in Foundries

	Total Number in Plants 1930	Number Installed Before 1920
LATHES		
Engine	2,717	1,944
Hand Turret	377	278
Power Turret	278	159
Automatic and Semi-Automatic		
Chucking (Not Chucking Machines)	59	40
Speed and Bench	59	
Crankshaft		
Toolroom Type	59	
Other		
CHUCKING MACHINES (Not Chucking Lathes)		
SCREW MACHINES		
Hand	79	40
Automatic, Single Spindle	337	238
Automatic, Multiple Spindle	59	20
CENTERING MACHINES	40	40
MILLING MACHINES		
Hand (No Power Feed)	178	79
Bench		
Plain (Knee and Column Type)	952	397
Universal (Knee and Column Type)	178	99
Vertical (Knee and Column Type)	99	59
Lincoln Type Manufacturing		
Continuous, Rotary Table or Drum Type	20	
Planer Type		
Other		
GEAR CUTTING MACHINES		
Rotary or Milling Type	59	40
Hobbing	20	
Planing or Shaping	20	20
Other	20	20
BORING MACHINES		
Horizontal Boring, Drilling and Milling	198	159
Vertical Boring Mills	436	278
Other	40	20
JIG BORERS		
DRILLING MACHINES		
Radial	595	357
Upright, One Spindle	1,706	873
Upright, Two or More Spindles	99	40
Upright Gang (Two or More Heads)	119	20
Sensitive, One Spindle	337	238
Sensitive, Two or More Spindles	99	79
Sensitive Gang (Two or More Heads)		
Two, Three and Four Way		
Other		
THREADING MACHINES		
Single Spindle Tapping	139	40
Multiple Spindle Tapping	20	
Pipe Threading and Cutting	178	119
Bolt Threading and Cutting	297	158
Thread Chasing	20	
Thread Hobbing and Milling	59	20
Thread Rolling		
Other		
PLANERS		
Open Side	119	79
Double-Housing	278	198
SHAPERS		
Vertical	99	40
Horizontal	773	595
Slotters	59	40
KEYSEATING MACHINES	139	99
BROACHING MACHINES	218	59
GRINDING MACHINES		
Plain Cylindrical	159	119
Universal Cylindrical	59	40
Surface, Reciprocating	258	79
Surface, Rotating		
Internal	20	
Cutter	99	40
Floor, No Feed Attachments	674	456
Bench, No Feed Attachments	59	40
Abrasive Disk	119	20
Abrasive Belt	40	
Centerless		
Other	278	159
POLISHING AND BUFFING MACHINES (Including those in Plating and other Depts.)		
Abrasive Wheel, Hand Operated	476	178
Abrasive Belt, Hand Operated		
Automatic and Semi-Automatic		
LAPPING MACHINES	297	
HONING MACHINES		
CUTTING-OFF MACHINES		
Parting Tool Type		
Power Hack Saw	833	337
Rotary Cold Saw	278	178
Bandsaw	79	40
Other	40	
WIRE FORMING MACHINERY		
Spring Coiling		
Other	20	20
WELDING AND CUTTING MACHINES		
Resistance Welding, Butt	20	
Resistance Welding, Spot		
Resistance Welding, Seam		
Resistance Welding, Other		
Arc Welding	218	20
Electric Cutting		
Gas Welding	278	59
Gas Cutting	198	20
RIVETING MACHINES, STATIONARY		
Pneumatic	79	
Hydraulic	20	
Power	694	20
PRESSES		
Punching Machines	159	59
Combined Punches and Shears	139	40
Hand, Arbor	159	119
Hand, Light Punch Press Work	79	40
Foot, Light Punch Press Work		
Power, Crank Type	139	119
Power, Toggle Type		
Power, Double Acting		
Power, Dieing Type		
Power, Trimming Presses	238	159
Power, Forcing, Arbor, Wheel	40	
Hydraulic, Bending, Forming, Drawing	139	59
Hydraulic, Wheel Forcing, etc	59	20
Baling, Power and Hydraulic		
Other		
BENDING AND STRAIGHTENING MACHINES		
Bending Brakes	99	20
Bending Rolls, Horizontal	99	79
Bending Rolls, Vertical		
Straightening Rolls		
Other	20	
SHEARS		
Knife	238	99
Rotary, Slitting	20	
NIBBLING MACHINES		
HAMMERS		
Drop	40	
Helve	40	20
Spring		
Steam	139	99
Pneumatic (not portable)	40	40
Other	20	20
FORGING MACHINES		
Bulldozers		
Hot Forging Machines		
Cold Headers, Bolt, Nut, etc.		
Cold, Swaging		
Forging and Flanging Presses, Hydraulic	99	79
Other Forging Machines		
Total	18,957	9,861

IDEAS FROM PRACTICAL MEN

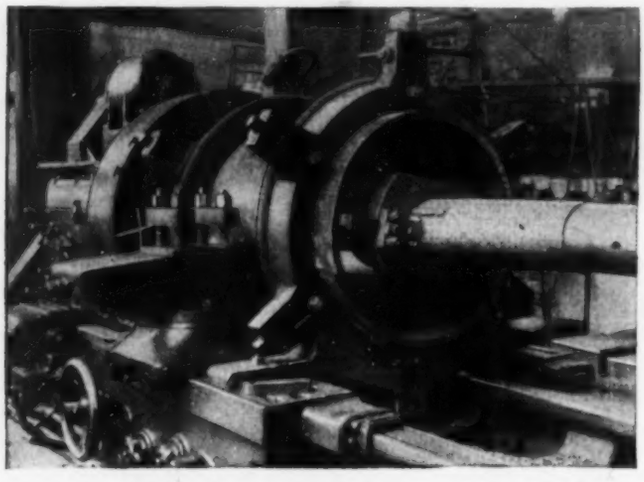
■

Lathe Attachments for Boring and Turning a Cylinder Liner

O. J. FRANKLIN

Boring, turning, and facing cast-iron locomotive cylinder bushings up to 30 in. inside diameter can be accomplished in 7 hours by means of the special lathe attachments illustrated. The devices, which are in use at the Burlington Shops at Denver, are applied to a Betts 48-in. heavy-duty lathe. A heavy machine is necessary because of the severe hogging cuts taken initially in the rough casting. A bushing 30 in. inside diameter by 46 in. long is shown being machined, but with slight changes the lathe will successfully bore bushings down to 16 in. inside diameter in the same fixture.

As the first illustration shows, when boring the inside diameter—the first operation—the work is supported in two carrier rings which are bolted to the lathe carriage. A special mandrel mounted on centers carries the boring tool which is rotated, but not moved

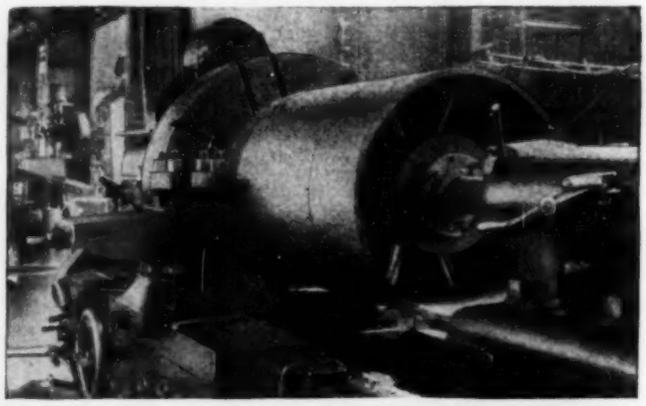


axially. Instead, the work is fed through the cutter when the carriage is advanced down the ways toward the tailstock.

Welded construction is largely used for the two carrier yokes, which may be recognized as discarded tires of a switching locomotive. At the base, these tires have been welded to cross-straps bent to the proper curvature and bolted at each end to the carriage bed. Six screw-operated clamping jaws with clamp bolts have been placed equidistant around the rim in housings which have also been welded to the tires. At the top is a pick-up loop for attaching to the crane hook for ease in handling the device on or off the machine.

One end of the solid mandrel is held on center at the tailstock, the other is upset to form a flange which is bolted to the faceplate of the lathe. The large tool-holder collar is keyed to the mandrel and held in position longitudinally by setscrews. Feed is 0.500 in. per rev. and the cut varies between $\frac{1}{16}$ and $\frac{1}{4}$ in., depending upon the variations in casting size and eccentricity of the two diameters. A flat-faced gooseneck tool is used for the finish cut.

To turn the outside diameter, the casting is centered on spiders on the finished bore as shown in the second illustration. This set-up necessitates a special mandrel, consisting of two major parts, a solid bar with two conical sections, and a hollow sleeve which can be slid along the bar axially. This sleeve carries two sets of eight radius bars having sloping ends that bear against the conical seats of the inner mandrel. One end of the mandrel is threaded and carries a large nut which is



locked to the sleeve by setscrews. In this way, by turning this nut the sleeve is advanced axially and the spider bars are advanced outwardly by wedge action until they firmly grip the work.

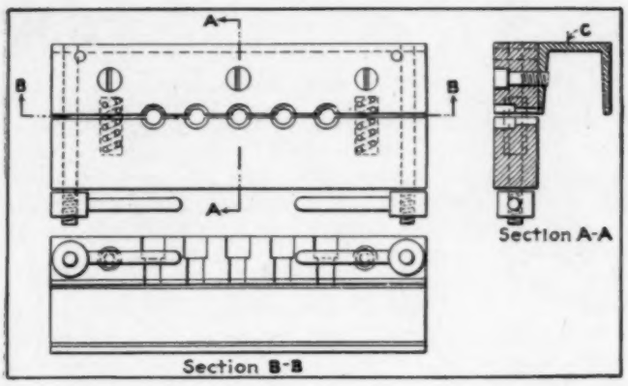
To keep the spider bars in place when the attachment is being set up, a helical spring is run around the group, in much the same manner as hone stones are held in place. A complete set of bars is available to take care of the range of inside diameters from 16 to 32 in. The cut is usually made at 40 ft. per min. with $\frac{5}{8}$-in. feed and $\frac{1}{8}$-in. depth. Work includes rough turning in two passes, finish turning, facing both ends, and scribing a centerline around the diameter.

■

Fixture for Slotting Screws—*Discussion*

OREN FOSTER
Unique Manufacturing Company

The screw-slotting fixture described by Harold F. Karrenbauer on page 332, Vol. 73, of the *American Machinist*, brought to my mind a similar fixture that has given satisfactory results. The fixture illustrated here with is suitable for slotting flat-, round-, fillister-head, and headless screws. In slotting flat-head screws, the heads should be buried below the surface of the fixture.



In that case the saw will travel between the blocks. For the other types, excepting the headless, the holes should be counterbored to a depth that will permit the screw heads to project a distance equal, at least, to the depth of the slots.

In operation, the screws are placed in the holes and the two lever nuts at the ends are tightened, clamping the screws by both bodies and heads. The channel iron shown provides a simple method of attaching the fixture to the table of the milling machine, and allows ample room for operating the lever nuts. Springs are used to hold the blocks apart while the fixture is being loaded or unloaded.

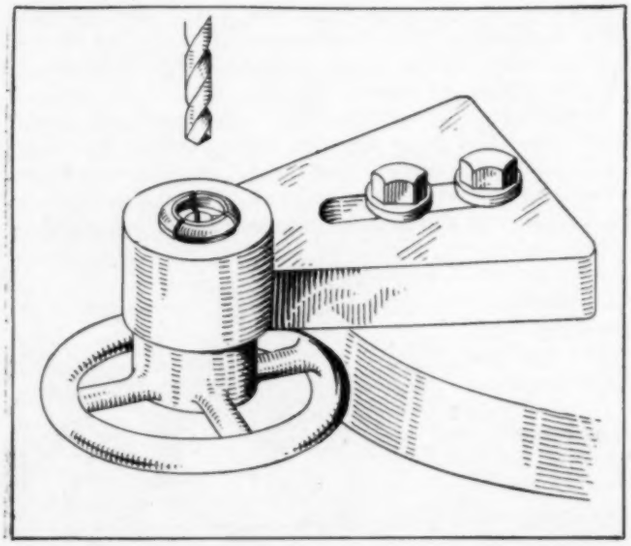
■

Fixture for Drilling Round Work

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Works

For holding small round parts while they are being drilled lengthwise, we use a spring collet mounted in a bracket attached to the drill-press table, as shown in the illustration. The handwheel at the bottom, by which the collet is opened and closed, is tapped to fit the thread at the end of the collet.

We have found this device very useful, not only for drilling, but for tapping and countersinking as well. It opens up a wider range of use for the collets of the bench lathe.



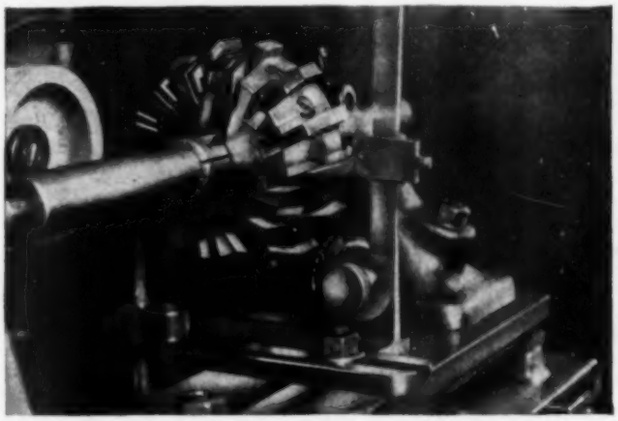
Clearance Gage for Cutters and Reamers

R. B. LOVELAND

The gage shown in the illustration is for checking the clearance ground on the teeth of reamers and milling cutters. It consists of a base graduated to 45 deg. on each side of the vertical; a blade pivoted to the base and having a vernier scale that will permit a reading of five min. of arc; and a head fitted to slide on the blade and be held in any position by a clamping screw. The gaging face of the sliding head has a projection forming a hook to engage one of the teeth of the tool to be ground.

In adjusting the gage, the blade is inclined to the angle of clearance to which the teeth of the tool are to be ground. The sliding head is then adjusted on the blade, so that the hook on its gaging face contacts with the pad at the top of the regular center gage furnished with the grinding machine. This adjustment of the sliding head brings the under surface of the hook to the same height as that of the centers of the machine.

In operation, the work is set up in the usual manner,



having the index finger under the tooth to be ground. After grinding a spot on one tooth, the gage is set on the machine table with the sliding head close to the cutter. The cutter is then rotated until the tooth just spotted contacts with the hooked surface of the sliding head. When the gage is pushed up so that the gaging surface of the sliding head is against the tooth, a visual inspection will show whether or not the spot ground on the tooth is at the same angle as that to which the gage has been set.

■

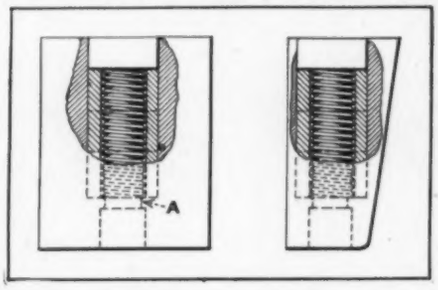
Repairing Back-End Wedges of Main Rods

R. B. MATCHETT

Wedges for the back ends of locomotive side rods are originally bored and tapped on the longitudinal center line to receive the adjusting screws, or wedge bolts, the length of the thread equaling three or four diameters of the adjusting screws. The threads in the wedges wear out first, but it is not practical to bore them out and retap them to a larger size, because both the wedges and the screws must be interchangeable on all engines of the same class.

In reconditioning the wedges, the threaded holes are

rebored, but not all the way through, leaving a neck, or seat, as at *A*. The holes are then bushed with hexagon nuts in which the corners have been turned off. The nuts are faced on both ends, screwed tightly together on a threaded mandrel, and are turned to a driving fit for the holes. Before removing the nuts from the mandrel, a line is scribed along their sides with the point of the turning tool. After removal from the mandrel, the nuts are pressed into the hole, care being taken to locate each one with reference to the scribed line, to preserve the continuity of the threads. Metal is then electrically deposited on the wall of the hole, on top of the top nut, to prevent it and the other nuts from working upward. The neck left at the lower part of the hole acts as a stop for the nuts at the bottom. After a tap has been run through the nuts to correct any possible distortion, or misalignment, the wedge is as good as new so far as the threads are concerned.

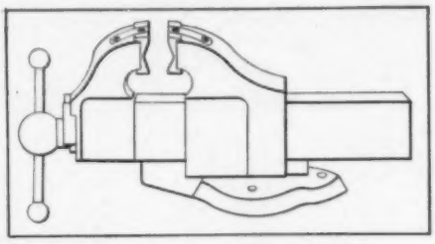


■

False Jaws for Bench Vises

P. L. Budwitz

False jaws for holding round work in the bench vise, such as the ones shown in the illustration, will be found very useful in any machine or repair shop. They are very convenient for holding shafts or spindles while filing or fitting keys. When round work is held in these jaws, there is no danger of its slipping out of the vise. The jaws are preferably made of soft metal, such as brass or copper, though they may be made of steel, hardened or left soft. A good angle for the V-grooves is 72 deg. The channels at the backs should be planed or milled to fit the vise jaws. Two flat pieces of steel to act as holders should be bent to suit the curvature at the tops of the vise jaws, and should be attached to them and to the false jaws by screws.

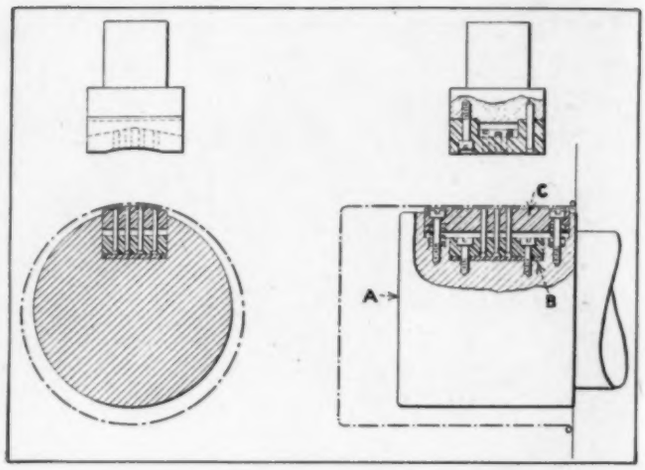


■

A Horn-Press Perforating Die

S. A. McDonald

Aluminum pots, such as the one indicated by dash-dot lines in the illustration, had to have a series of holes punched from the inside outward, so the burrs thrown up by the punches would be on the outside. The perforating was done on a horn press. The horn *A* is of cast iron, and its shank extends through the press frame and is secured in place by a nut on its threaded end. The horn is milled out to receive the punch-holder, which is held in place by screws. The punches are backed up by the hardened plate *B*. The depressible stripper *C* is held up by springs against the heads of screws. The upper part of the tool consists of the die, which is held in a holder attached to the ram.



In operation, a pot is placed on the horn and up against the press frame to locate it for punching. When the ram descends, the die holds the pot against the stripper and carries them both down, compressing the springs. As the ram continues its descent, the punches pierce the metal. The punchings are pushed up into the die, where they accumulate until they pass through the holes and into the clearance space above. They fall out of the clearance space, due to its tapered bottom and to the vibration of the press. As the ram ascends, the stripper follows it under pressure of the springs until its face comes above the tops of the punches, where it is stopped by the heads of screws. After the ram has completed its upward stroke, the pot is removed from the horn.

■

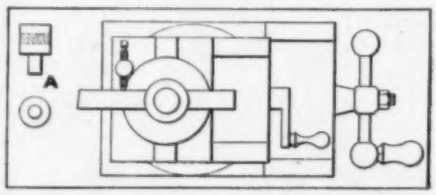
Preventing Lathe Tools From Swinging
Discussion

Charles Kugler

In an article under the title given above, on page 332, Vol. 73, of the *American Machinist*, H. Moore shows an ingenious device for preventing lathe tools from swinging under pressure of the cut.

The article recalls to my mind a different and more simple method I have seen for accomplishing the same result. A hole is drilled in the toolblock, or in the compound rest, to receive the stud *A*, which is placed on the drag side of the tool. A setscrew in the tapped hole in the stud bears against the tool, preventing the pressure of the cut from swinging it.

I find that on the Pratt & Whitney shaper, two such studs and setscrews are used, one on each side of the tool, securely bracing the tool against pressure from both directions.

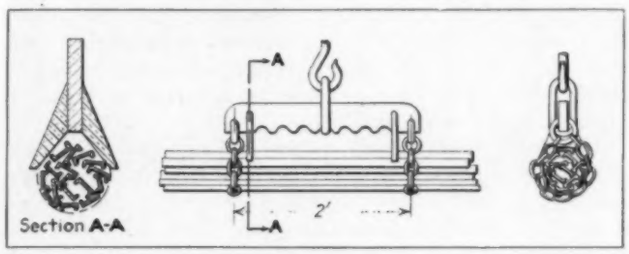


An Easily Balanced Sling for Long Work

ROBERT W. HAGGAR
Hamilton, Ontario, Canada

In hoisting long rods, pipe, or structural shapes by a crane it generally takes several trials before a rope—or a chain sling can be placed to balance the load. In the illustration is shown a sling that is easily attached, and by which the load can be balanced without trouble.

At the ends of a flat bar are the chains to go around the load. Just inside of the chains, pieces are welded to the bar form V's, as shown in the section *A-B*. The bar has notches on its under side, and is provided with a link by which it is suspended from the crane hook. Since the load is held up in the V's by the chains, when the load is resting on the floor the bar is prevented from dropping on top of the load, permitting the link to be placed in any one of the notches to determine the correct



point of suspension. In attaching the sling, it need be placed only approximately in the center of the load, since the center can be quickly found by shifting the link to the proper notch in the bar.

■

Compound Pillar-Press Tools for Stamping Watch Wheels

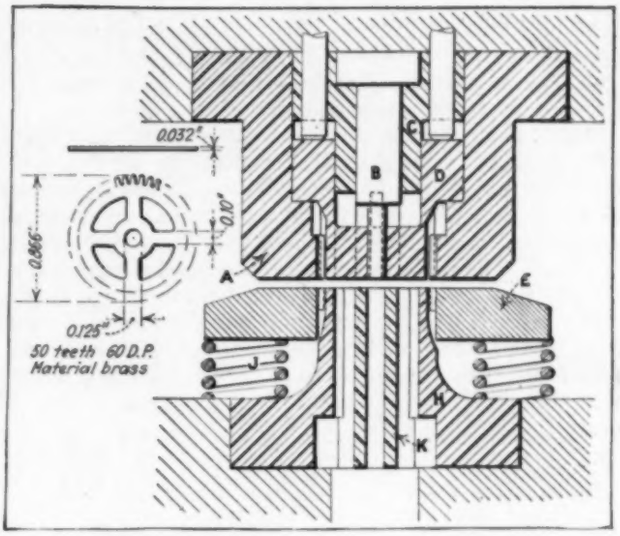
JAMES R. CORNELIUS
Coventry, England

Wheels of brass for a cheap line of watches were required to be made in lots of several thousand at a time. The price allowed would not permit them to be made in the usual way, that is by blanking and piercing, followed by shaving the outer diameter to size and then hobbing the teeth. This method is accepted as being the best where really accurate work is required, it being impossible to blank, pierce, and form the teeth accurately by the follow-on type of tools, because of the small center hole and the thin stock which do not permit centering devices to function accurately.

The pillar-press tools herein described have been found to overcome the centering difficulty, and all wheels produced by them were as concentric as were those made by the hobbing process. If the cutting edges of the punch and the die are made carefully and are sharp enough to produce a smooth finish, the tooth flanks will have a smoother finish than is generally made by other methods.

One of the wheels is shown at the left of the tools. It has 50 teeth of 60 diametral pitch. The outer diameter is 0.866 in.; the diameter of the hole is 0.125 in.; and the width of the spokes is 0.100 inch.

The upper tool consists of the punch plate, which



carries the springs necessary for operating the pressure plate; the die *A;* the punch *B* for the center hole; the punch *C* for the holes between the spokes; and the pressure plate *D*. This tool is shown as if it were rotated about 45 deg. on its axis, so as to show the slots in the punch for the holes between the spokes, and the disposition of the pressure plate. The lower tool consists of the stripper plate *E;* the lower punch *H;* the stripper springs *J*; the center die *K*; and the bolster plate.

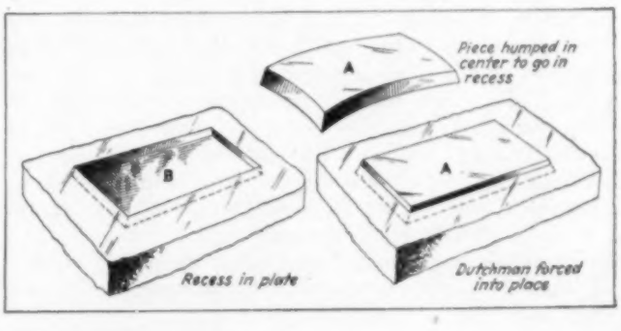
In operation, as the ram descends, the stock is held firmly between the die and the stripper plate. The punches for the center hole, the holes between the spokes, and the teeth, cut the metal simultaneously. The stamping is forced upward into the die, and all the punchings fall through the holes in the lower punch and the center die, passing out to a container below the press bed. Sufficient pressure is supplied by the pressure plate to keep the work flat, eject it from the die, and push it back into the strip of stock, on the upstroke of the ram.

■

Repairing Gears Having Broken Teeth —*Discussion*

I. B. RICH

Dovetailing a new section into the rim of a gear wheel, as shown by T. Smith on page 23, Vol. 74, reminds me of a practice indulged in many years ago when hand work predominated in the shop and when locomotive crossheads were polished all over till they shone like a mirror. The side plates were of wrought



iron and occasionally a small pocket of slag marred the appearance of the plate. Then the "dutchman" came into play as a restorer of beauty and, when well done, its presence could rarely be detected.

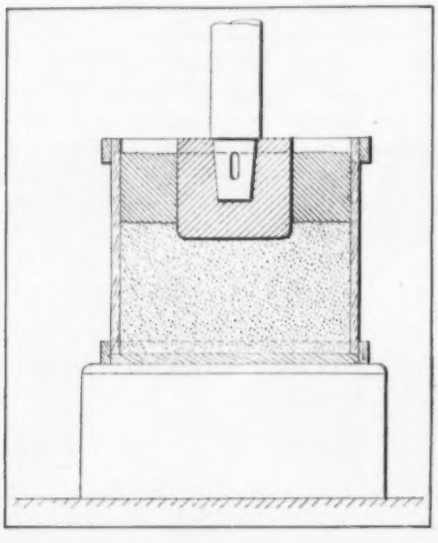
The "dutchman" in this case was a piece of wrought iron as at *A*, somewhat thicker than the depth of the recess or pocket *B*, into which it fitted. This pocket was carefully chipped out with a cape chisel, undercut all around and deep enough to hold the "dutchman" firmly in place. The piece to be fitted was beveled at approximately the same angle and then bumped up in the center enough to allow it to drop into the recess. It was then driven home with a hammer and the whole surface finished even with the side plate. That was before the days of the great "putting on" tool that is now in every shop.

■

Removing a Jammed Setscrew
Discussion

J. T. Towlson
London, England

If the reader will turn to page 366, Vol. 73, of the *American Machinist*, and read Stanly Pivonski's little article under the title given above, he will find it most interesting and useful. As I read down the page, I really thought that he had pushed out the jammed setscrew by the force of the compressed grease. But reading farther and finding that the effect of the grease was simply to lubricate the parts, I allowed my doubts to be removed, and had, perforce, to agree that it was a good dodge.



It may be that while on the subject of jammed parts, the method by which I once removed the hammer head from the piston rod of a heavy steam hammer will be of some interest. After removing the anvil from its foundation, a rough box partly filled with foundry sand was put in its place. The hammer head was lowered onto the sand, as shown in the illustration. Half a ton of molten iron was then poured on top of the sand in the box. In a few seconds the hammer head came off of the piston rod, pressing down the sand. As soon as the iron had set, and only just set, the box was quickly knocked away and the cooling iron was hammered from the hammer head. The iron was then broken into pieces of a size convenient for charging into the cupola. As was intended, the molten iron heated the hammer head and caused it to expand and come loose from the piston rod.

SEEN AND HEARD

●

Station Machines and Hydraulic Feeds

FASHIONS are not confined to wearing apparel. They seem to affect machine design almost as completely if not as frequently. Just now station-type machines seem to be the vogue for various purposes and in a number of sizes. The basic idea is not new but the application seems to have taken the designer's fancy with the result that several have recently appeared as claimants for the favor of the production managers in many industries.

There is, however, a basic reason for the present trend. The station type of machine eliminates the loss of loading time in most cases, allowing continuous operation of all the tools except for the time required for indexing. And on some operations, at least, this is a substantial saving, a saving that offsets the increased investment in fixtures, in tools, and in tool spindles.

Hydraulic feeds afford another example of fashion in design. Starting many years ago and lying fallow largely because the need was not urgent, the idea has now become a part of standard design in many lines of machines. Furthermore, the hydraulic idea is being extended to clamping work in fixtures on machines of different types, taking the place of compressed air for this purpose. Here again the time saved over hand operated clamps is a logical reason for its adoption, much more reason than can usually be found for fashions along other lines.

Chains on Machine Tools

DESIGN and practice seem to go in cycles, sometimes of long duration. Take chains on machine tools as an example. The early lathes and planers used chains to pull the tables and carriages along the beds. Rough, hand-forged chains they were, and they soon gave way to rack-and-pinion and screws as moving mechanisms. Chains were out-dated and discarded.

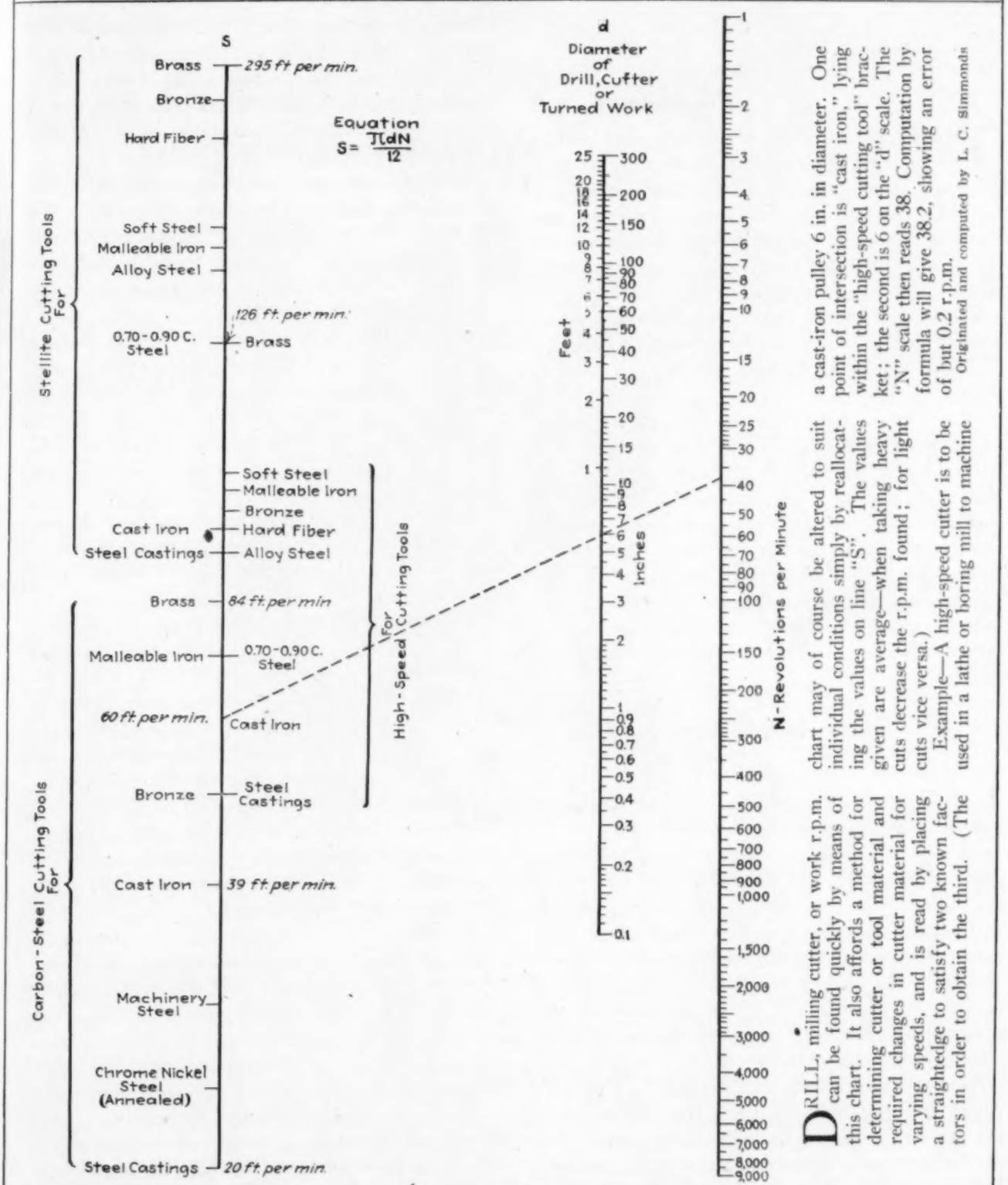
Now the cycle is changing and chains are being used for rapid traverse on lathes, and for feeds on other machines—not the old type of chains, of course, but accurate modern chain of the "silent" and roller types.

It often happens that way. Many a good scheme lags for a time, not because of inherent faults in the idea, but because some of the elements were not good enough. —*J.R.G.*

Where There's a Will

MECHANICAL problems have a way of yielding to persistent attack. Much has been said about the difficulty of machining corrosion-resistant steel of the 18-chromium, 8-nickel vintage. And as we all know, threading is the supreme test of clean cutting. A progressive screw machine maker, who refused to admit it couldn't be done, has turned out a machine for threading eight stainless steel screws per minute. The secret lies in cutting the right- and left-hand sides of the thread independently but simultaneously. Two cutters are used thus splitting the chip. —*J.*

Cutting Speed Chart



DRILL, milling cutter, or work r.p.m. chart may of course be altered to suit individual conditions simply by reallocating the values on line "S". The values given are average—when taking heavy cuts decrease the r.p.m. found; for light cuts vice versa.)

Example—A high-speed cutter is to be used in a lathe or boring mill to machine a cast-iron pulley 6 in. in diameter. One point of intersection is "cast iron," lying within the "high-speed cutting tool" bracket; the second is 6 on the "d" scale. The "N" scale then reads 38. Computation by formula will give 38.2, showing an error of but 0.2 r.p.m.

Originated and computed by L. C. Simmonds

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VOL. 74 NO. 6

Producing to Sell

TIME WAS when production and selling were regarded as the opposite poles of business. In most companies, the men responsible for these two activities had little in common; one made the product, the other sold it—neither felt the need of the other's active co-operation. Today this attitude has changed decidedly. The efficient salesmanager knows what the market wants and what it will pay for a certain product; his opinion is given weight when new designs are contemplated.

A new angle of interest is now in the process of development—that of the production man in marketing problems. Perhaps this is the most logical approach to marketing. The day has passed when those directing engineering and manufacture can plan for the future on a purely mechanical basis. To be most effective, they must achieve an intimate insight into the needs of the industries they serve. They must attempt to divine what their market will demand tomorrow.

New Methods for Old

IN A certain study course for foremen there are fifty-two subjects included. Drafting is not one of them—a strange omission when one reflects that the shop has led and directed drafting practice ever since the day when the owner was the engineer and the foreman the only draftsman.

That the foreman is still carrying an unnecessarily large part of the burden is ably demonstrated by the leading article in this issue wherein the advanced technique of one company is contrasted with the usual practice of other companies. The new method there shown of "stepping-up" dimensions, either from a center line or from two edges, is applicable alike to the toolroom and to the contract shop that machines large parts. The article is sincerely recommended as a major contribution to the metal-working industry.

How Prepared, Mr. Secretary?

PROMPTED BY General Pershing's comments on America's lack of preparation at the time of the World War, Secretary of War Hurley gave an interview to the New York *World* and the North American Newspaper Alliance. "Nobody," said he, "wants another war. We would be remiss in our official responsibilities if we did not consider the possibility of almost any sort of an emergency."

"If such a national emergency should come, the government would not be caught off guard. We have not failed to profit by the lessons we learned in 1917 and 1918. Our plans then for mobilization of man power and of industry were vague and incomplete.

"Tomorrow a different and a brighter picture would be presented. With the declaration of war by Congress there would spring into immediate action elaborately and carefully conceived organizations for the marshaling not only of trained forces of soldiers but of industrial sources of supply.

"The War Department has mapped out a comprehensive scheme for industrial mobilization in time of war. For ten years selected officers have been studying the situations under which our national security might be jeopardized and have determined the kinds and amounts of supplies needed in such emergencies.

"For years we have been searching out and listing factories suitable for the production of guns, airplanes and the many other items on our list. We know just where these factories are located and what they are capable of producing."

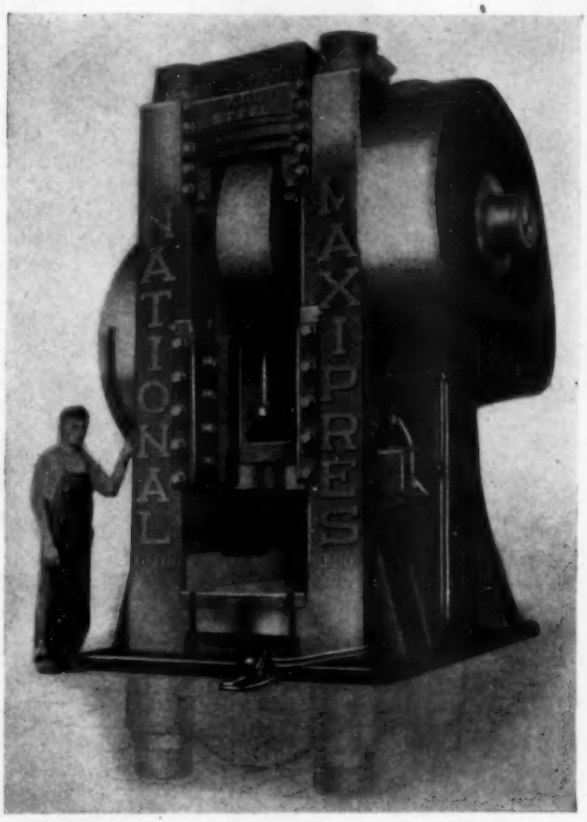
Doubtless the War Department knows where the factories are located, and Secretary Hurley may sincerely think his department knows what they are capable of producing.

His thought is just as sincerely to be questioned.

Except for the simplest military and naval material, the factories themselves do not know their present war-time capabilities. Times have changed; methods have changed; devices have changed. A new generation of men is in charge of production. How many automobile plants, for example, could go into immediate emergency production of Christy's eighty-five-mile-an-hour tank? The need for Educational Orders becomes every day more vital.

SHOP EQUIPMENT NEWS

National "Maxipres" Coining or Finishing Press



National "Maxipres" Coining or Finishing Press, which is made in eight sizes varying in weight from 19,000 to 368,000 lb., and which is suitable for coining, swaging, or forming of parts, hot, semi-hot, or cold, at high speeds

RAPID coining, swaging, or forming of parts, hot, semi-hot, or cold, can be done with the "Maxipres" developed by the National Machinery Company, Tiffin, Ohio. Since in many instances coining eliminates machining, it may be referred to as "machining to size by pressure." Formerly, the extreme pressures required for this work have confined this operation to a slow-operating type of machine. The "Maxipres," however, has been designed to provide high pressures and high operating speeds, together with accuracy, because of the rigidity embodied.

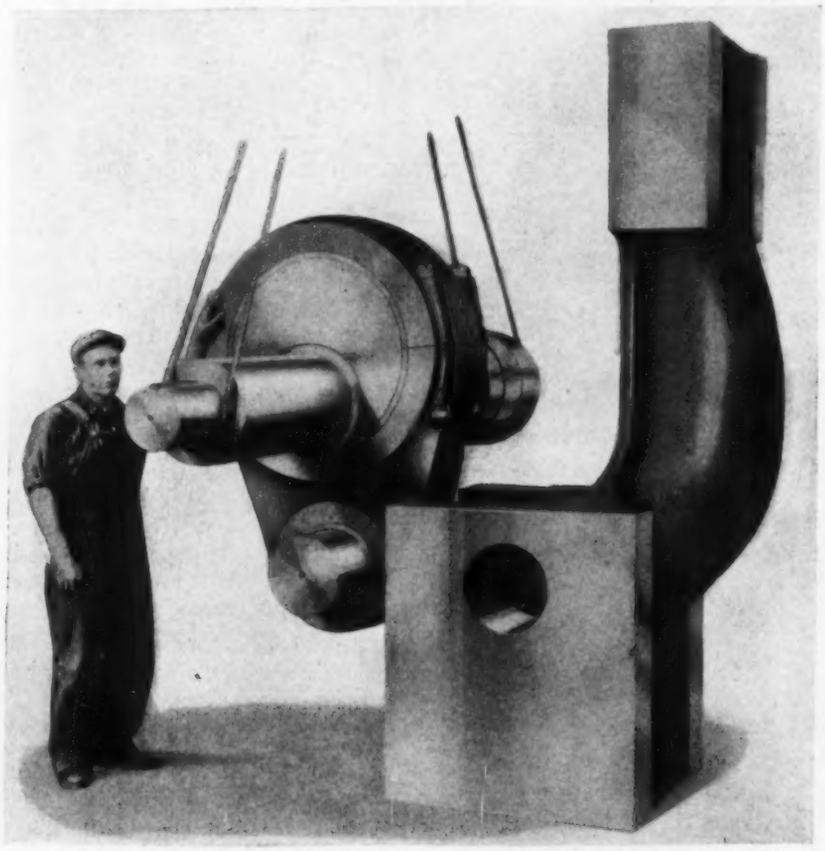
The entire frame, including the base, crown and columns, is a one-piece steel casting bored to receive four tension bars shrunk into position. All cross-members are cast integral, forming a box section, and the distance between the die seat and the main shaft has been kept short to obtain great stiffness. The deep base and massive crown distribute the working loads to the tension bars without deflection in themselves. This construction makes it possible to coin or form to size regardless of variation in temperature or size of the original blank. Only three bearings are employed between the source of power and its application.

Several features have been carried over from the National High-Duty forging machine. One is the patented over-arm slide, which extends over and above the eccentric shaft, forming an extended pilot bearing, and giving increased area and support. This design makes possible a great reduction in distance from the die bed to the shaft. The great slide length made possible by this construction results in a slide that is narrow compared to its length, and thus has ability to withstand off-center pressures and still travel accurately in a straight line.

A one-piece, non-adjustable pitman is employed, there being no threaded adjustments, since all adjustments of the "Maxipres" for die height are located on the bed frame proper. The main shaft is of the full eccentric type, and the large diameter and unbroken contour insure against spring. Both upper main bearings support the shaft immediately adjacent to the side faces of the eccentric and close to the center line of the load, thus placing the shaft approximately in direct shear, and permitting heavy stresses without spring or deflection. The lower half of each shaft bearing housing is supported in the bed frame by a tapered wedge block, which serves as a means of adjustment.

Operating control of the "Maxipres" is obtained by the use of the National quadruple-abutment clutch, which starts the press in a quarter revolution. Rapid action of the quadruple clutch increases production, and also prolongs die life when operating on hot work, by reducing the time the hot metal is in contact with the dies. Moreover, an air trip sets the clutch parts in operation faster than is possible with a manually operated starting device. The flywheel is of the friction-slip design, which provides a release for stored energy in the event of sudden stoppage, and serves to protect the motor as well as the machine.

Vertical adjustment for the dies is secured through a large wedge on the base of the bed frame. This construction provides close adjustment, and the adjusting wedge covers the entire length and width of the upper part of the base. Therefore, the pressure from the dies is distributed over a large area. Locating the adjustment at this point permits the pitman to be made solid and free from adjusting screws. Both the upper and lower die seats are provided with knockouts placed outside



Eccentric shaft, pitman, and over-arm ram of the "Maxipres"

the frame housings, leaving the entire space between the columns clear. Roller bearings support the countershaft, and a high-pressure oiling system supplies all bearings. Wedge adjustments are provided for accurate take-up of side wear on the slide. Front and back adjustment of the slide is secured through adjustment of the bearing caps. All slide wearing surfaces on the frame have separate wearing plates or removable liners. Bronze bearings are scraped and fitted to the housings and shaft.

The National "Maxipres" is made in eight sizes, Nos. 1, 1½, 2, 3, 4, 5, 6, and 7½, varying in weight from 19,000 to 368,000 lb. The various size ranges are adapted for semi-hot coining of any part that can be produced in a National high-duty forging machine of corresponding size rating.

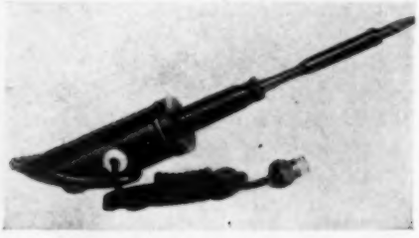
Cook High-Speed Hopper

For the rapid feeding of small parts, such as screws, bolts, nuts, and washers, the Asa S. Cook Company, Hartford, Conn., has introduced a high-speed hopper. This device may be used in conjunction with a packaging or a grossing machine or to feed the parts for another operation at rates up to 1,200 pieces per min.

The parts are dumped into the hopper, where they are engaged by diagonal fins on an endless conveyor platform that moves them up an inclined trough. A cut-out in one side of the upper end of the trough allows the parts to slide down a parallel incline. Some parts fall into a slot, while the excess returns to the hopper. A revolving grooved disk spins the parts to facilitate positioning them head up in the slot. The parts are then conveyed up a second incline by means of cross pins carried in a bicycle chain. From this second position they are fed downward by gravity. A small gap is left between the end of this channel and the corresponding member of the receiving machine. If the blanks cannot be taken as fast as they are fed, they back up to this gap and the following ones fall back into the hopper. The machine is driven by a ⅓-hp. motor mounted on the supporting table beneath the hopper. The width of the slot is adjustable for different sizes of work.

"Esico" Cordless Soldering Iron

Where a cord is objectionable, a hot iron is always available for use when the "Esico" cordless soldering iron is employed. This tool is a development of the Electric Soldering Iron Company, Inc., 135-139 West 17th St., New York, N. Y. On continuous work two bases and two irons may be used, so that one

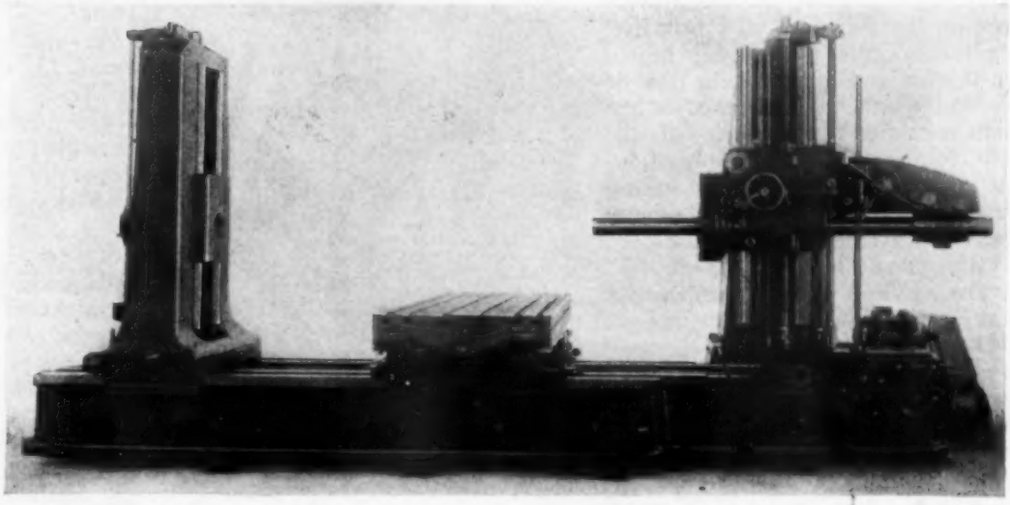


Esico Iron plugged into base

Cook High-Speed Hopper for feeding screws and nuts at 1,200 per min.

iron is always heating while the other one is being used. Projecting from the handle is a ring terminal which is inserted in the socket base in such a manner that no matter how it is inserted contact is made. The base is made at an angle, so that the iron can be withdrawn and caused to continue in an arc to the work. When withdrawn from the base, the iron is disconnected from the circuit, so that it is limited to soldering within its drain capacity. It is especially suitable for work on switchboards or apparatus where the cord is likely to interfere with the work.

"Universal" No. 50 Horizontal Boring Machine



"Universal" No. 50 Horizontal Boring Machine, which has a distance from the faceplate to the outer support of 144 in., and a distance from the top of the table to the center of the 5-in. bar of 50 in.

A bed having four ways is employed in the No. 50 horizontal boring machine recently built by the Universal Boring Machine Company, Hudson, Mass. The extreme width across the ways on the top is 56 in., of which 24 in. is for the bearing surface for the carriage. Width of the bed on the floor underneath the table and carriage assembly is 60 in., and the bed is of full box construction with openings for cleaning chips at both the front and the rear.

The table and carriage assembly is of sturdy design, the height of the assembly from the top of the bed to the top of the table being 18 in. The carriage ways are 6 in. wide and, for the 120-in. table, are 140 in. long, so that two thirds of the table is supported by the carriage at the extreme forward and rear positions. Controls for the table and carriage have been concentrated in a single bracket to eliminate unnecessary walking on the part of the operator. From this bracket, the cross feed of the table by hand and power, clamping of the table to the carriage, and the clamping of the carriage to the bed are accomplished. The carriage is clamped to the bed by means of two cast-steel clamps, one at the front and one at the rear, both being operated simultaneously from the control bracket.

In the rear post assembly, the massive slide assembly is counterbalanced by a weight inside the column. To secure maximum rigidity, V-ways are used on both sides of the post. A powerful clamping device is applied to the slide and is so arranged that the slide can be clamped from the floor, regardless of the position of the bar with relation to the top of the table. A Bowen "One-Shot" oiling system is applied to the rear post assembly.

The main boring bar is 5 in. in diameter, with a No. 7 Morse taper, and is hardened throughout its entire length. Spindle driven gears are of heat-treated alloy steel, the high speed drive to the spindle being through herringbone gears. Spiral bevel gears are also used in the head assembly.

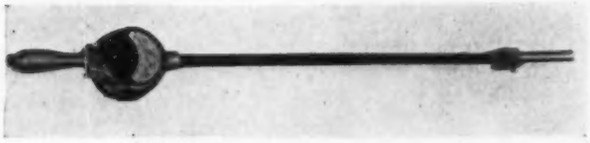
Oiling of the gearboxes and the head assembly is by a power-driven pump, using filtered oil. The filter is so located that replacement or cleaning is accomplished easily, and the indicating oil gage keeps the operator advised as to whether the oil pump is working correctly and also as to the condition of the filter.

The spindle sleeve is mounted on large Timken roller bearings, making it possible to supply this machine with a maximum spindle speed of 400 r.p.m. Dimensions of the machine illustrated are: Distance from faceplate to outer support, 144 in.; table, 40 in. wide by 120 in. long, with 100 in. of power cross feed; distance from top of table to center of bar, 50 in.; main boring bar, 5 in., and net weight, 54,000 lb.

Machines will be manufactured with beds to take up to 168 in. between the faceplate and the outer support; tables up to 60 x 144 in. with 120 in. of power cross feed, and vertical travels up to 84 in., and with high spindle speeds.

"Pyro Lance" Contact-Type Pyrometer

Temperature measurement of heated metals having low surface hardness can be undertaken with the "Pyro Lance" contact-type pyrometer developed by the Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill. The thermocouple



"Pyro Lance" Contact-Type Pyrometer for temperature measurements of heated metals having low surface hardness

employed is made from a special alloy. Since the heated surface under test has a relatively low surface hardness, the thermocouple points can penetrate quickly, resulting in an almost instantaneous reading.

Since the "Alnor" pyrometer operates on the thermo-electric principle, the thermocouple wires when heated on the hot end experience a flow of electricity, which is registered on the milli-voltmeter. The scale of the milli-voltmeter in the handle is graduated in temperature units and is read in degrees Fahrenheit. The meter itself has a case diameter of 4½ in., with a scale 3½ in. long.

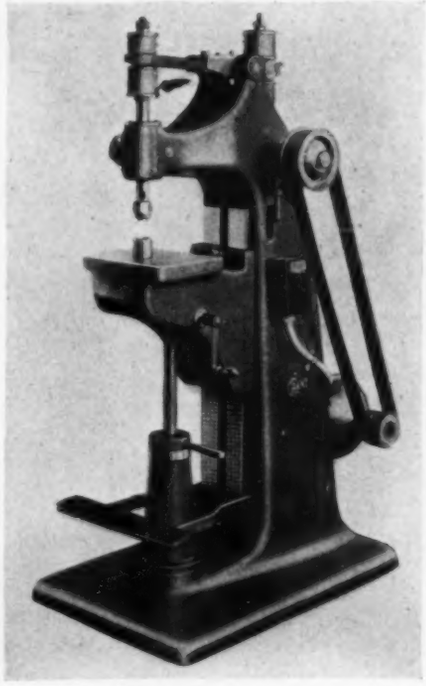
The indicator can be furnished in several different temperature ranges, although the 0 to 2,000 deg. F. range is generally required. In this range, each division is 25 deg. F., and can be read easily to a half division or less.

The thermocouple wires are approximately 4 in. long. The over-all length of the instrument is 36 in., and the weight is about 3 lb. It is equipped with an angle adjusting device, so that the thermocouple wires can be placed at an angle.

Grant Model 5A Rotary Vibrating Riveter

Heading cold rivets up to ⅝ in. in diameter can be done on the No. 5A rotary riveting hammer announced by the Grant Manufacturing & Machine Company, Bridgeport, Conn. This type of machine is known as a vibratory hammer, the hammer spindle being caused to vibrate in a vertical direction at speeds between 1,200 and 1,500 blows per minute. Heavier jobs require the higher speed.

To get the best results from the hammer, the table has been made extra heavy to insure the work being rigidly supported and to reduce the tendency of the work jumping off the anvil when struck. The table is supported by a jack screw and clamped tight to the frame by two heavy bolts. The jack screw is also used to raise the table. To prevent the jack screw from turning while the machine is in operation, a large lock-



Grant Model 5A Rotary Vibrating Riveter with speeds to 1,500 blows per min.

nut is provided which is tightened or loosened by the handle shown. The table and jack screw can be removed easily to permit the substitution of special tables and fixtures.

The riveting tool used on this machine is threaded to fit the outside diameter of the hammer spindle and is made from hexagon stock, as this permits the use of a wrench. The hammer spindle is rotated clockwise through a worm drive located inside the spindle arm. The worm shaft is driven by a V-belt connecting with the main shaft in the rear of the machine. The hammer spindle is made from a chrome-vanadium steel forging, heat-treated.

The helve is made from a seasoned hickory wood. The main shaft in the rear of the machine has at its center an eccentric bearing, which gives the connecting rod a reciprocating motion. The clutch is of the friction type with a Raybestos lining. Thrust ball bearings are used between the bronze nut on the mainshaft bearing bushing and the inner clutch plate. A brake is provided to stop the hammer spindle in its uppermost position. The brake is operated by the treadle rod. Only a light pressure need be required to operate the treadle. The machine requires a 3-hp. motor, and a ⅝-in. rivet can be headed in two seconds.

Kearney & Trecker Full-Back-Blade, Tungsten-Carbide Milling Cutters

Face-milling cutters basically designed for the high cutting speeds and feeds employed with cemented tungsten carbide have been placed on the market by the Kearney & Trecker Corporation, Milwaukee, Wis. The cutter is known as the full-back blade type because each blade is provided with a solid, positive contact along its entire back face, a feature that is essential for the correct application of tungsten carbide. Instead of having the blades project beyond the face of the cutter body, they are set prac-

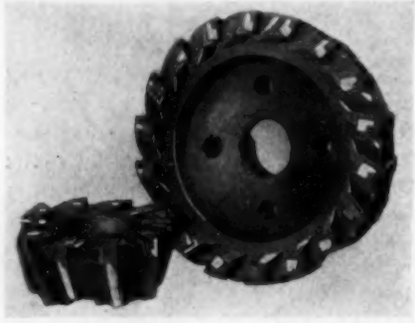


Fig. 1—Kearney & Trecker Full-Back-Blade Milling Cutters designed for use with tungsten carbide. The 5- and 8-in. sizes are illustrated

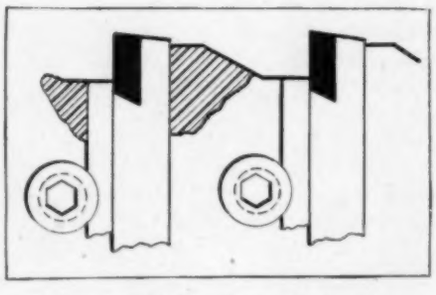


Fig. 2—Chip clearance is attained by cutting suitable slots in the body for each individual blade

tically flush with the face, whereas chip clearance is attained by cutting suitable slots in the body for each individual blade. This construction is shown in a sectional view, Fig. 2. It offers a positive full-length backing for the blades and insures maximum support directly back of the cutting edges.

The cutter can be furnished in sizes ranging from 5 to 14 in. in diameter, either left or right hand, with blades

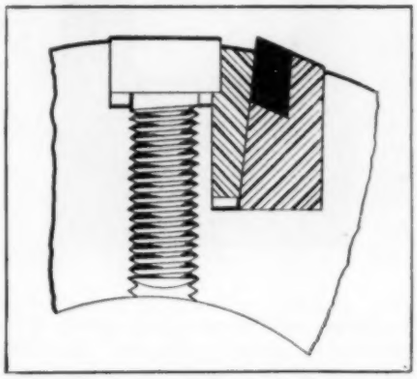


Fig. 3—Each blade is held in place by a tapered wedge, the wedge being held by a hardened screw

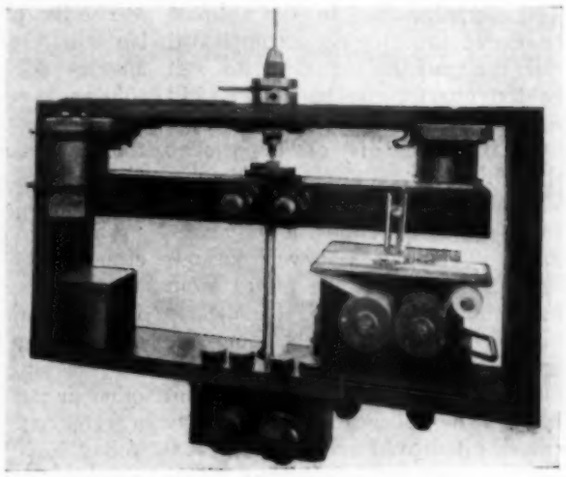
that are applicable for medium and semi-roughing, or finishing cuts. Their design is suited to milling cast-iron, semi-steel, malleable iron, bronze, copper, and aluminum.

The cutter body is made from an extra-heavy steel forging, heat-treated, hardened, and ground. Each blade is made with a tapered face and held in place by a wedge having a corresponding taper. This construction is illustrated in Fig. 3. Hardened screws are used to hold the wedges in place.

The use of hardened steel pins in the cutter body, which in turn fit into cross slots machined in the blades, eliminates end slippage. One pin is used for each blade, but by having a series of five holes in each body slot and four cross slots in each blade, adjustments can be made in increments of $\frac{1}{16}$ in.

"Foeppl-Pertz" Damping Tester

For the determination of internal frictional losses of materials, the Southwark Foundry & Machine Company, Testing Equipment Division, Philadelphia, Pa., is announcing a "Foeppl-Pertz" damping tester weighing approximately 160 lb., and having over-all dimensions of 24x18x10 in. This damping tester is mounted on a frame hung from the ceiling on a wire about 10 ft. long. This unusual way of mounting the machine is one of the special features which provide the high accuracy needed in determining the small amounts of work absorbed by internal friction in the specimen. The test rod is placed centrally and clamped rigidly on its bottom into the frame by means of heavy screws and carries on its top an oscillating mass, which makes a reciprocating rotary movement about the axis of the specimen, twisting the same back and forth. A small pivot avoids any lateral movement, so that the stresses in the specimen are purely torsional.



"Foeppl-Pertz" Damping Tester for determining internal frictional losses of material

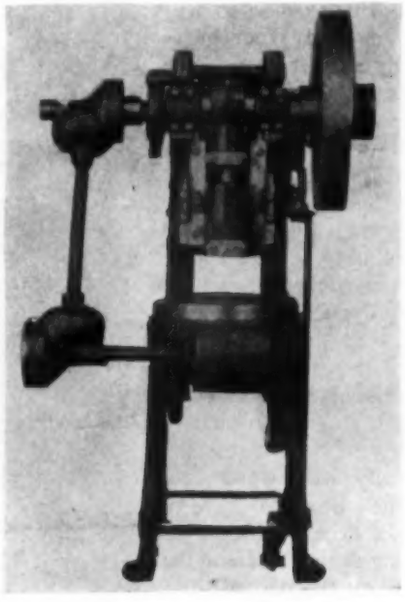
The test is started by twisting the mass to a desired amount and holding it in a twisted position by means of an adjustable electro-magnet. Upon breaking the electrical contact, free oscillation is produced. The stylograph attached to the mass at the lower right records a damped free vibration diagram on the chart moved by the clockwork. These curves are obtained in a few minutes and represent the damping characteristic of the material, which can be replotted in the form of diagrams, showing the amount of work absorbed in relation to the rate of stress.

Federal Dial-Feed Mechanism for Presses

For use on punch presses or other equipment where dial feeds are employed, the Federal Press Company, Elkhart, Ind., has developed an improved type of dial-feed mechanism. This feed is actuated from the crankshaft through two sets of bevel gears and a cam under the dial plate. The cam engages with hardened rollers attached to the bottom side of the dial, and every revolution of the crankshaft rotates the dial $\frac{1}{12}$ revolution. The same cam that actuates the movement of the dial plate also locks the dial positively in place so that it is impossible for the dial to skid by. This is accomplished by the indexing cam passing between the rollers on the bottom of the dial.

Besides the prevention of skidding without the use of brakes, stops or lock pawls, this dial-feed mechanism eliminates troublesome springy arms and a clattering reciprocating slide on the side of the dial. With the present mechanism everything is enclosed, so that there is no danger to the operator. The only moving part exposed is the dial plate itself. The cam that actuates the dial movement runs in a bath of oil.

Dial movement is accomplished in less than a quarter of the revolution



of the crankshaft. In fact, almost the entire indexing is accomplished while the crankpin is passing through the top quarter of the stroke, and while the ram itself is almost at a standstill. This is of importance where the job requires considerable die space.

On some operations it is necessary to employ a lower kickout mechanism to eject the pieces from the plate. Actuation of the ejector through cams and levers from the ram makes an awkward arrangement, but with the kickout actuated from the camshaft beneath the dial, as with this improved mechanism, a compact arrangement is obtained. This dial feed mechanism can be mounted on any make of press.

"Ideal" Automatic Plating Barrel

Automatic loading and unloading of the "Ideal" automatic plating barrel permits it to be readily introduced as a plating unit in an automatic batch cleaning and plating assembly. This barrel, developed by N. Ransohoff, Inc., Cincinnati, Ohio, consists of a drum of 3-in. maple divided in the middle section by a diaphragm of rubber-covered steel. A Formica screen attached to the center of the diaphragm extends to the discharge end of the drum. Anodes and cathodes are suspended from two bars which extend into the barrel from the charging end. Anodes are nickel blocks with perforated Formica covers to prevent work from shorting against them. The cathodes are rubber-covered chains with terminal plates which dangle in the work.

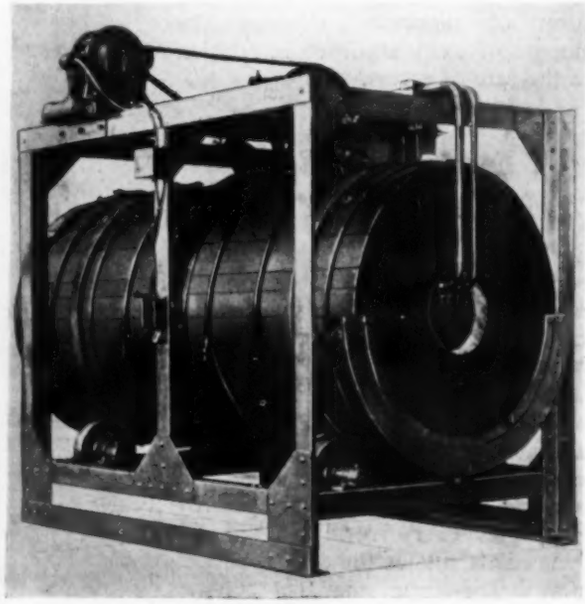
The diaphragm is so arranged that when rotating in one direction the work is held in the plating chamber, gently agitated in the plating solution. When the barrel is rotated in the opposite direction, the work is automatically discharged into the Formica screen, the excess solution being drained off and the work discharged.

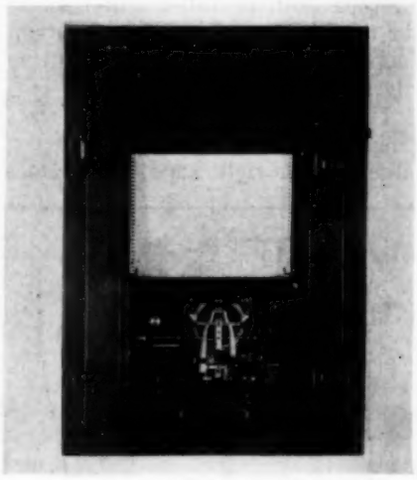
The barrel is mounted over a rubber-lined tank, which holds a certain amount of plating solution. This solution is constantly being circulated by a pump through a filter and into the barrel. This method of constant circulating and filtering produces a clear plate.

One assembly of automatic batch cleaning and plating machines places ahead of the plating unit two barrels for giving pressed work a potash roll and a water roll before plating. After the plating barrel it places two other units for giving the plated work a secondary water roll or nickel rinse and a soap roll, the work then proceeding to a sawdust drier. With such an assembly the work proceeds through the various processes in batches. Since all units discharge by reversing the direction of the drum, one man can control all the operations by merely pushing buttons, and each batch can be held in any particular barrel as long as desired.

Leeds & Northrup Anticipatory Temperature Controller

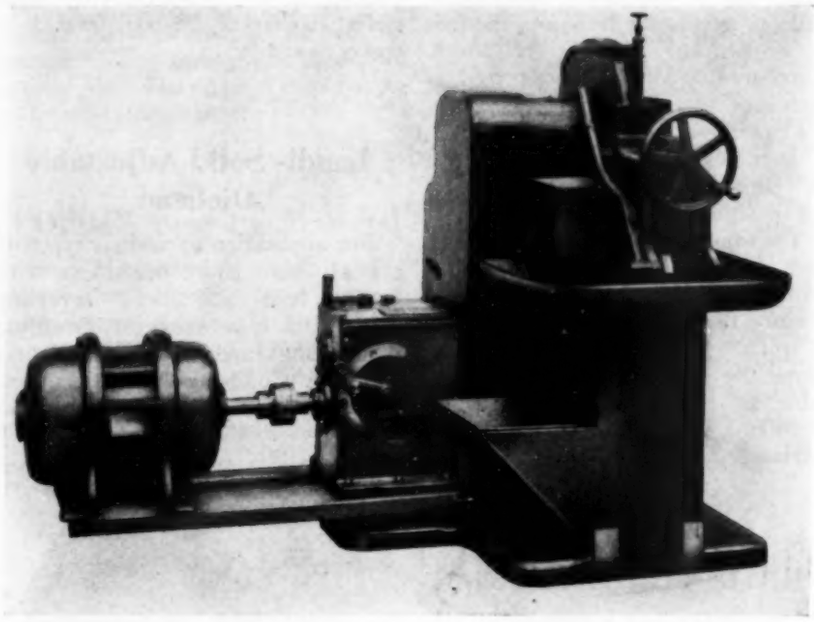
A pyrometer-controller that responds in proportion to the rapidity of temperature trends has been placed on the market by the Leeds & Northrup Company, 4901 Stenton Ave., Philadelphia, Pa. The instruments does not supplant, but supplements, the four other types of temperature controllers manufactured. The anticipatory controller controls the heat balance of an oven or furnace, quickly correcting for





variables in furnace operation and restoring correct thermal balance throughout the unit. A three-position, double-motor, balancing valve drive is used with this instrument.

When the temperature begins to depart from the control setting, the controller acts immediately. It moves the valve in the proper direction and also starts an open clutch to rotating toward its closed position. The clutch is started in anticipation of the possibility that the first valve motion may not be great enough. If it is great enough, however, as shown by the trend of the temperature within a time corresponding to the natural lag of the furnace, the clutch stops. Otherwise, the clutch engages a motor which shifts the normal position of the valve. As soon as the trend is toward the control limits, the controller automatically anticipates the danger of overshooting and again shifts the normal position of the valve. The controller then makes further slight adjustments so as to restore the heat balance and run the temperature back to within the control limits. There is no continuous hunting or overshooting, and no crossing the control line in a series of irregular swings. To compensate for an extreme change in operating conditions, the anticipatory controller may shift the valve to the new normal, and return the temperature to within the control limits in as many as 19 steps, all in a very short period of time, such as 5 min., and the temperature does not vary beyond 3 deg.



An abrasive wheel, a friction disk, or a saw blade can be used on the Cochrane-Bly No. 21 High-Speed Cut-Off Machine, which has capacity for round stock up to 4 in.

Cochrane-Bly No. 21 High-Speed Cut-Off Machine

An abrasive wheel, a friction disk, or a saw blade can be employed on the No. 21 high-speed cut-off machine announced by the Cochrane-Bly Company, Rochester, N. Y. The machine has a hardened and ground spindle mounted in dust-proof Timken roller bearings. The heavy carriage is mounted on ball bearing ways, giving easy movement of the carriage when moved to the work. The carriage is extended at the front underneath the knee, and fully covers the ball bearing ways. A lever having a ratio of 3 to 1 is employed for moving the carriage forward.

A four-speed gearbox furnishes drive, the speeds varying from 2,400 to 3,600 r.p.m., to give peripheral speeds to a 16-in. abrasive wheel of 10,000 to 15,000 ft. per min. The machine can be speeded so that the speed changes compensate to a degree for the wear in the wheel diameter, and maintain an approximately uniform peripheral speed as the wheel wears down. Drive from the speed box to the spindle is by means of multiple V-belts, and an idler pulley compensates for variation in pulley centers due to carriage movement and thus maintains uniform belt tension.

Either wet or dry cutting may be employed, a pump delivering a stream of coolant. The manufacturers have demonstrated that the wear of the wheel when cutting wet is just half the wear when cutting dry for a given number of cuts at the same rate. Cold rolled bars up to $1\frac{7}{16}$ in. can be cut on this machine in $2\frac{1}{2}$ seconds, and 1-in. rounds or squares in about one second. A hand-operated vise holds the work firmly, and the uniform movement of the carriage gives a steady approach of the wheel, resulting in accurate cuts. The machine can also be used with a saw blade for cutting non-ferrous metals, wood, fiber, Bakelite, and light steel sections.

Specifications: capacity, round stock, 4 in.; diameter of abrasive wheel or saw, 16 in.; speed range of spindle, 800 to 6,000 r.p.m.; spindle speeds for abrasive wheel, 2,500 to 3,600 r.p.m.; spindle speeds for saw blade, 800 to 3,600 r.p.m.; spindle speeds for friction disk, 4,200 to 6,000 r.p.m.; floor space, with belt drive, 38x40 in., with motor drive (without speed box), 38x50 in.; net weight, 1,500 lb. with belt drive, and motor required, 5 to 15 hp., depending on the work to be done.

Brown & Sharpe Formed-Wheel Truing Attachment

An attachment for truing three radii, on the two sides and the face of a grinding wheel, has recently been designed by the Brown & Sharpe Manufacturing Company, Providence, R. I. This attachment is not stocked as a regular piece of equipment, but is available for customers requiring such a device on any of the grinding machines manufactured by the company. While built for a particular job, that of dressing the wheel that grinds a notch in the end of a needle

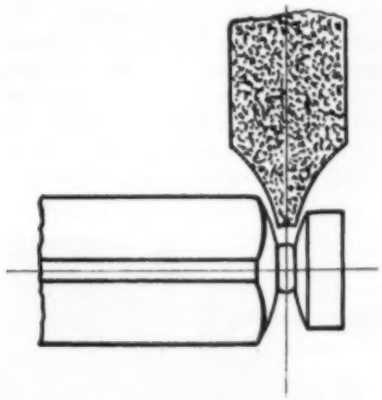


Fig. 1—Formed wheel for grinding a notch on the end of a needle valve

valve, as shown in Fig. 1, this device can be adapted to many jobs having similar requirements.

The device consists of a base bolted to the table of the machine and carries a swiveling member. Three positions are provided for this member, each being one from which a truing operation on the wheel is done. Incorporated in the swiveling mem-

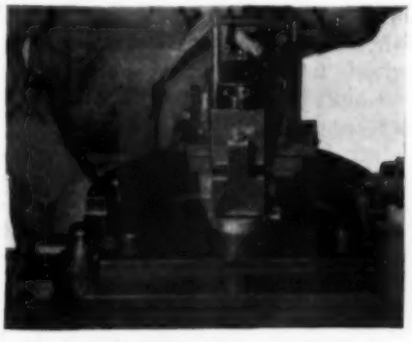


Fig. 2—Brown & Sharpe Formed-Wheel Truing Device having the diamond point and former adjusted by means of the gage

ber and bolted rigidly to it is a former, shaped to the required radius. The diamond toolholder is carried on a pair of slides mounted on the swiveling member. These slides are placed at right angles to each other, giving the holder both longitudinal and transverse movements. A follower forms a part of the slides, and by means of spring tension it is kept in contact with the former.

The swiveling member is set in the central position, and by means of a gage the diamond point and former are adjusted so that they are in proper alignment, as shown in Fig. 2. Adjusting screws on either end of the former, by which it can be moved to right or left as required, assist in making these adjustments. The diamond is then placed at approximately the center of the grinding wheel face, by using the machine table handwheel, and the table stop is set so that the diamond can be correctly relocated for subsequent

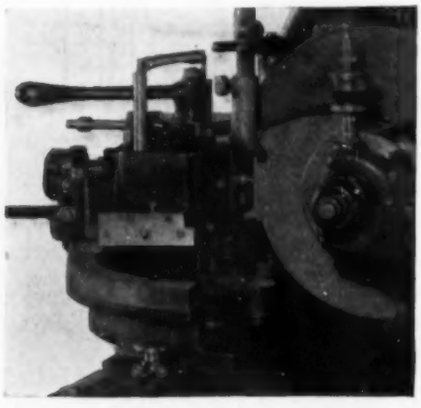


Fig. 3—Brown & Sharpe Formed-Wheel Truing Device with the swiveling member indexed to the central position

truings. The device is then indexed by a hand lever to either the right or left position and the side of the wheel is dressed by feeding in the wheel, using the cross feed of the machine, and swinging the diamond across the wheel by means of the upper hand lever. When the dressing of one side is completed, the cross feed stop is set. The wheel is then moved away from the diamond and the device is swung to the other side. In this position, the opposite side of the wheel is dressed in a similar manner, until the cross feed comes to the stop. Then the swiveling member is indexed to the central position, as shown in Fig. 3, and the wheel fed in, meanwhile moving the diamond across the face until the face is dressed to the correct width. Another stop on the cross feed is then set.

Once these stops are correctly set, it is necessary only to index the swiveling member to the three different positions for subsequent truing of the wheel, dressing the wheel from each position by coming up to the cross feed stops, as their relative position does not change as the wheel is worn. It is not necessary to remove the device from the machine table, as it is mounted on the right-hand end, where it is out of the way during the grinding of the work.

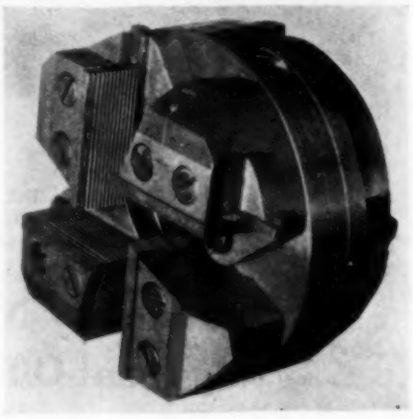
Rivett No. 104 Precision Internal Grinder

To simplify the construction and provide higher spindle speeds, the Rivett Lathe & Grinder Corporation, Brighton, Boston, Mass., now employs either the Dumore No. 5 or No. 7 high-speed spindle units on the cross-slide. Less power is now required to operate the machine, and the number of parts have been reduced considerably. The table is now heavier and has longer ways. The top swivel slide can now be set over to the desired taper by a single screw adjustment. It is locked by a clamp at each end. Graduations for the taper are shown on one clamp and can be read easily without stooping. An endless belt is now employed on the pump and can be changed instantly.

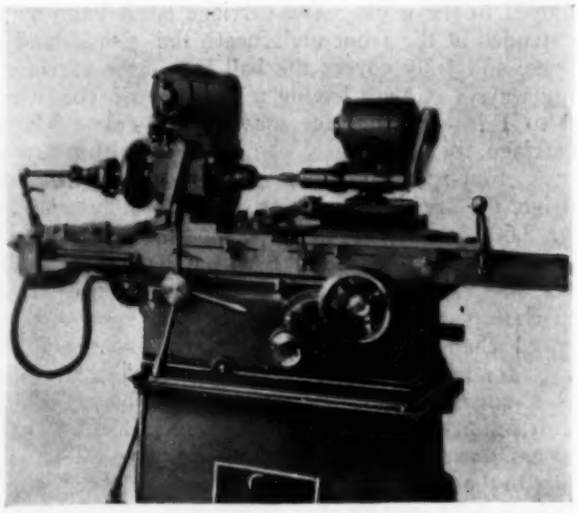
With the No. 5 Dumore and a set of pulleys for the motor and spindle, the speed can be varied between 3,850 r.p.m., and 34,000 r.p.m. A 10,000 r.p.m. motor is used with this grinder. For the No. 7 unit employing an 8,000 r.p.m. motor, spindle speeds from 2,650 r.p.m. to 16,500 r.p.m. can be obtained. For either unit, the speeds are available in six steps. Specifications: Swing, 8 in.; maximum length of hole ground, 2 in.; work-carrying head swivel movement, 90 deg.; and floor space, $3\frac{1}{2}$x$5\frac{1}{2}$ ft.

Landis Solid Adjustable Diehead

For application to various types of special automatic machines with power feed and head reversing mechanism now used for threading pipe fittings and valves, the Landis Machine Company, Inc., Waynesboro, Pa., has placed on the market



a solid adjustable diehead. The tool is available in $\frac{1}{4}$-, 2-, and 4-in. sizes, and is of compact design and covers a wide range. The assembly consists of four major parts, all of which are made of high-carbon steel, heat-treated and ground. Adjustment for size is effected by two adjusting



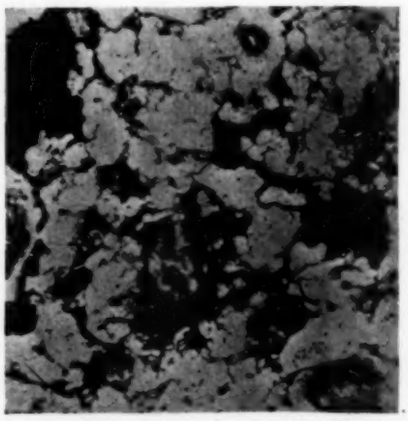
Rivett No. 104 Internal Precision Grinder now employs the Dumore grinding unit to save complicated driving mechanisms and reduce the power consumption

screws that lock the diehead and impart a rigidity comparable to that of a solid die. The diehead employs the patented Landis chaser.

"Oilite" Bearing Material

High oil content is the feature of the "Oilite" bearing material marketed by the Amplex Manufacturing Company, 7900 Joseph Campau Ave., Detroit, a division of the Chrysler Corporation. This material is an alloy of copper, tin and other metals and, if squeezed in a vise, drips oil. If permitted to stand in the sun, oil will also seep out. In the manufacture of this bearing material, it is subjected to tremendous pressure, heat-treated to form a sponge, and then impregnated with hot oil in a vacuum. It absorbs up to 40 per cent of oil by volume.

"Oilite" has greater strength than common in "self-oiling" bearing materials. Because of its high oil content, a hydraulic cushion exists that also permits bearing loads in excess of those carried by conventional bearing materials. It is claimed to be superior to high-grade cast bronze for applications where severe duty and high pressures are encountered. It imparts a high polish to shafts, instead of scoring them, and can be made to a high standard of accuracy.

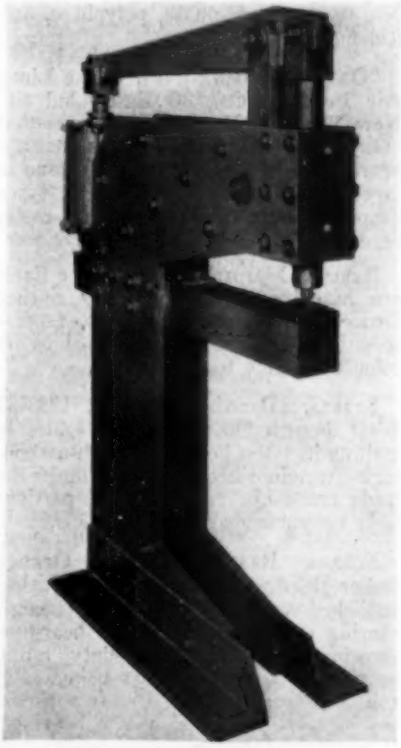


Cross-section of "Oilite" Bearing Material magnified approximately 275 times. The dark areas are filled with oil

The material has been used for some time in Chrysler-built passenger cars and trucks for such parts as spring shackles, steering gear cross shafts, and pump bearings.

Hannifin Air-Operated Piercing Press

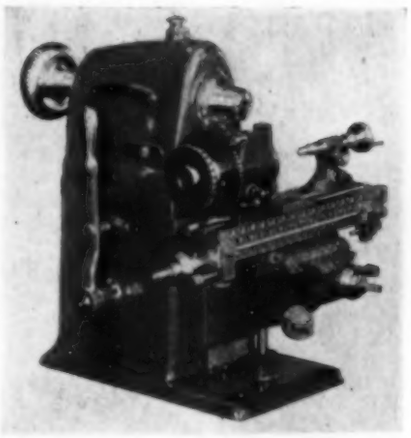
An air-operated piercing press designed specifically for punching holes $1\frac{5}{16}$ in. in diameter in $\frac{3}{16}$-in. copper boiler shells has been designed by the Hannifin Manufacturing Company, 621 S. Kolmar Ave., Chicago, Ill. The air cylinder is mounted on the back of the frame and through a 7-to-1 lever arm produces a pressure of 24,000 lb. at the ram. With an 8-in. cylinder stroke, the ram stroke is $1\frac{1}{8}$ in. The cylinder bore is 8 in. The reach over the horn is 25 in.



Steel construction is used throughout, the frame sides being standard steel plate with angle-iron feet and the horn a solid steel bar. It is keyed into the frame sides and is bolted into place with eight through bolts. The cylinder itself is of cast iron and is pivoted at the bottom so as to articulate during the stroke.

"Cataract" Motor-Driven Bench Milling Machine

A "Cataract" motor-driven bench milling machine weighing only 105 lb. has been placed on the market by Hardinge Brothers, Inc., 4147-49 Ravenswood Ave., Chicago, Ill. This machine was developed as an outgrowth of the "Cataract" bench lathe and incorporates the same features in design. It employs a fully enclosed headstock with V-belt drive throughout, a 6-speed transmission with the high and low speeds controlled by a clutch, and additional speeds obtained by shifting one belt. The drive unit is mounted under the bench, doing away with overhead shafts and belts. Left-hand cutters can be used by applying a reversing type of switch to a standard reversible motor. Collets can be interchanged between the cutter head of the milling machine and the dividing head, and collets from the standard No. 4 bench lathe can also be employed.

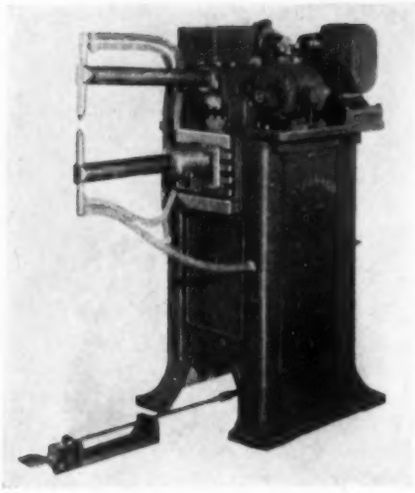


"Cataract" Motor-Driven Bench Milling Machine with spindle speeds from 240 to 1,725 r.p.m.

Specifications: Working surface of table, 12 x $3\frac{1}{8}$ in.; longitudinal travel of table, $5\frac{1}{2}$ in., transverse travel of table, 4 in.; vertical travel from center of spindle, $6\frac{1}{2}$ in.; range of speeds, 240 to 1,725 r.p.m., and net weight, 105 lb.

"Standard" Automatic Spot Welders

Automatic spot welders in 20, 25 and 33 kva. capacities have been announced by the Lenney Machine & Manufacturing Company, Warren, Ohio. This type of welder places the drive on top, with all mechanism mounted on the base. It takes the same floor space as the foot-power machines of the same capacity. The automatic switch is also mounted on



"Standard" Type AM Automatic Spot Welder, available in 20, 25 and 33 kva. capacities and with five speeds from 45 to 140 strokes per min.

the top of the machine, being driven directly from the main shaft. It has a wide range of contact time.

Power is supplied by a ½-hp. motor controlled by a treadle operating a positive clutch. Five speed changes from 45 to 140 r.p.m. are provided, and current regulation is by means of an auto coil with eight steps.

TRADE PUBLICATIONS

CORE BAKING. The American Gas Association, Committee on Industrial Gas Research, New York, N. Y., has issued a booklet "The Application of Heat to Core Baking" by H. L. Campbell, Department of Engineering Research, University of Michigan.

ENAMELING SHEET STEEL. The University of Illinois, Experiment Station, Urbana, Ill., has issued a pamphlet "The Effect of Furnace Gases on the Quality of Enamels for Sheet Steel," known as bulletin No. 214. The price is $0.20.

GAGE BLANKS. The U. S. Department of Commerce, Bureau of Standards, has issued Commercial Standard CS8-30 entitled "Plain and Thread Plug and Ring Gage Blanks." Copies are obtainable from the Superintendent of Documents, Washington, D. C., for $0.15.

INSPECTED APPLIANCES. The Underwriters' Laboratories, National Board of Fire Underwriters, 207 East Ohio St., Chicago, Ill., has issued a "List of Appliances Inspected for Accident Hazard," as of October, 1930.

JIG BUSHINGS. The National Boring Tool Co., 7627 Jefferson Ave., Detroit, Mich., has issued a small bulletin entitled "The Birth of a Notion," describing the construction and application of its rotating jig bushings and listing the sizes in stock.

LIGHTING BULLETINS. The General Electric Co., Nela Park Engineering Department, Cleveland, Ohio, has available two booklets on lighting practice as follows: "Tendencies in Lighting Practice — 1930" and "Lighting for Seeing."

MOTORS. The Master Electric Co., Dayton, Ohio, has issued price book No. 98 on single-phase, polyphase, and d.c. motors.

"OXY-ACETYLENE TIPS." The Linde Air Products Co., 30 East 42nd St., New York, N. Y., now announces that "Oxy-Acetylene Tips" makes its appearance with the January 1931 issue in larger size and with attractive typographical style to make it more easily read.

REBUILT MACHINE TOOLS. The Eastern Machinery Co., 3261-3269 Spring Grove Ave., Cincinnati, Ohio, is distributing Machinery List No. 31 of its rebuilt machine tools in stock.

STEELS. Darwin & Milner, 1258-64 West Fourth St., Cleveland, Ohio, is mailing its latest booklet on high-carbon, high-chromium steels marketed under the trade name of "NEOR," and particularly recommended for press tools.

ROLLER BEARINGS. The Orange Roller Bearing Co., Orange, N. J., has published a revised edition of its engineering data sheets on roller bearings, showing staggered, heavy-duty radial bearings, journal bearings using solid roll construction, self-aligning thrust bearings, and tapered roller bearings. It gives 76 pages of specifications and capacities for these types.

STEEL SHOP FURNITURE. The Angle Steel Stool Co., Plainwell, Mich., has issued a 32-page condensed edition of Catalog M-S, showing its complete line of steel office and shop furniture.

TACHOMETERS. A 16-page booklet on indicating and recording tachometers in various models, together with the electric generators used in operating them, has been issued by The Brown Instrument Co., Philadelphia, Pa. Applications are also shown.

VARIABLE SPEED CONTROL, HANDBOOK OF. The Reeves Pulley Co., Columbus, Ind., is distributing a small handbook measuring 6¼x4 in., which is convenient as a textbook on variable speed control, and in addition contains a service manual and complete engineering data with reference to all sizes of Reeves variable-speed transmissions.

PATENTS

JANUARY 27, 1931

Metal-Working Machinery

Riveting Press. Hardin D. Thweatt, Hudson, Ohio, assigned to The Adamson Machine Co. *Patent 1,790,029.*

Power Press. David Crossley, Trenton, N. J. *Patent 1,790,041.*

Centrifugal Casting Machine. Leonard W. Saine, Birmingham, Ala. *Patent 1,790,060.*

Machine for Winding Spiral Springs and Inserting the Wound Springs in Drums. James P. Appleby, Los Angeles, Calif., assigned to Frank Graves Sash, Door and Mill Co. *Patent 1,790,218.*

Grinding Machine. Charles H. Norton, Plainville, Conn., assigned to the Norton Co. *Patent 1,790,245.*

Molding Machine. Lewis G. Davis, Rockford, Ill. *Patent 1,790,408.*

Machine Tool. Lathe Turret. William Wallace Potter, Pawtucket, R. I. *Patent 1,790,440.*

Grinding Machine. Maxwell I. Mathewson, Providence, R. I., assigned to Brown and Sharpe Manufacturing Co. *Patent 1,790,550.*

Gear - Tooth - Finishing Machine. Hubert D. Tanner and Robert R. Raber, West Hartford, Conn., assigned to Pratt & Whitney Co. *Patent 1,790,560.*

Tools and Attachments

Means for Measuring Sounds Produced by Machinery. Frank Wooton Highfield, Coventry, England. *Patent 1,790,046.*

Welding Shield. Thomas Edward Catherwood, Hagersville, Ontario, Canada. *Patent 1,790,226.*

Caliper. Clark V. McCarley, Toledo, Ohio. *Patent 1,790,277.*

Feeding Means for Punch Presses. Roy O. Gilburg, Wausau, Wis., assigned to Marathon Electric Mfg. Co. *Patent 1,790,301.*

Starter for Mechanically-Driven Machines. Edward H. Lorenz, West Hartford, Conn., assigned to Hartford-Empire Co. *Patent 1,790,352.*

Punching Mechanism. Russell M. Roberts, Detroit, Mich. *Patent 1,790,444.*

Chain-Swaging and Feeding Device. Henry C. Du Bois, Stratford, Conn., assigned to American Chain Co. *Patent 1,790,464.*

Gear Cutter. Nikola Trbojevich, Detroit, Mich. *Patent 1,790,609.*

Processes

Method of Making Splined Gears. Ernest F. Davis, Muncie, Ind. *Patent 1,789,968.*

Method of Lining Bearings. Frederick C. Jones and Verne Skillman, Detroit, Mich., assigned to Bohn Aluminum & Brass Corporation. *Patent 1,789,979.*

NEWS OF THE WEEK

Gray Iron Reports Show Favorably

December operations in the gray iron industry show up more favorably than was expected, according to the Gray Iron Institute. December invariably witnesses a seasonal slump and usually shows quite a decline under November operations, but December of this year showed 48.5 per cent of normal, as compared with 50.6 per cent for November. New business showed a rise to 47.2 per cent in December from 37.1 per cent in November, while unfilled orders mounted from 24.2 per cent in November to 36.2 per cent in December. Most gray iron foundries reported a better business outlook. District No. 3, comprising the territory of Wisconsin and Illinois and the area west of the Mississippi River and south to the country's border, shows the greatest activity. Class A plants, or those with normal production of 1 to 100 tons per month, again show the greatest activity by normal production. (Normal is average monthly production during the last three calendar years.)

Sidney to Build Kempsmith Line

According to an announcement by Joseph T. Ryerson & Son, Inc., with principal offices in Chicago, the production of "Maximillers," production millers and automatic indexing machines heretofore produced by the Kempsmith Manufacturing Co., Milwaukee, will henceforth be produced by the Sidney (Ohio) Machine Tool Co. A. C. Getz, General Manager of the Sidney company, has announced that the building of the older type of Sidney engine lathes will be discontinued and efforts will be confined exclusively to the production of the milling machine line and the Monotrol and Tritrol types of lathes. A number of the men formerly identified with Kempsmith in its engineering and production personnel will be employed at Sidney. H. L. Livesay, former factory manager for Kempsmith, has been placed in full charge of production of milling machines at the Sidney plant.

The preliminary announcement of this charge was made in *American Machinist* last week. According to A. G. Bryant, General Manager, Machinery Division of Ryerson, the Ryerson Company will act as general distributors of of the line, direct the sales policy and furnish, through a special engineering staff, including Walter Mickelson, formerly associated with Kempsmith, the necessary services to the trade and to agencies. No change will be made in the dealer set-up. Acquisition of the milling machine line rounds out the group of machine tools which the Ryerson Machinery Division is handling as "General Distributors" under the new policy recently inaugurated. Under this plan, Ryerson acts as the sales department for the manufacturers of these products. Included in the products thus marketed by Ryerson are Ohio shapers and planers, Dreses radial drills, Monotrol and Tritrol Lathes, and Ohio floor-type and table-type horizontal boring mills.

Machine Displays Planned in St. Louis

The American Machinery Mart, a permanent display of all types of machinery, is to be located in the $5,000,000 St. Louis Mart Building, now under construction at Twelfth Blvd. & Spruce St. It is planned to have displays of all types of machines in operation in the 21-story skyscraper, spare parts of machines also being kept in stock there.

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INCLUDED among the papers written in a preliminary summary for the 140th annual meeting of the American Institute of Mining & Metallurgical Engineers, to be held in New York from Feb. 16 to 19, are a number of technical papers on metals. These include "Failure of Cast-Iron Kettles in Lead Refining," by Carl E. Schwartz; "Investigation of Anodes for the Production of Electrolytic Zinc," by H. R. Hanley, C. Y. Clayton, and D. F. Walsh; "Die Pressing of Brass and Copper Alloys," by John R. Freeman, Jr.; "Plasticity of Copper-Zinc Alloys at Elevated Temperatures," by Alan Morris; "Nickel-Clad Steel Plate Works," by William G. Haumpton, F. P. Huston, and Robert J. McKay; and "Directional Properties in Cold-Rolled and Annealed Copper," by Arthur Philips and E. S. Bunn.

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AMERICAN manufacturers invested about $1,355,000,000 in branch plants in the period to the end of 1929, according to a recent statement.

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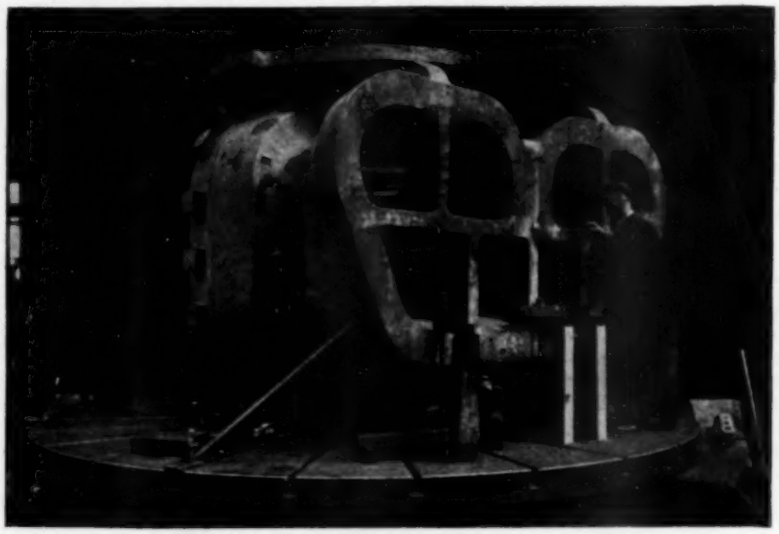
A REPORT advocating the establishment of a competent agency to balance the forces of consumption, production and distribution, in order that ultimately control may be imposed upon the nation's economic life, was adopted at the annual meeting of the American Engineering Council in Washington. The report, prepared by a committee headed by Ralph E. Flanders, vice-president of the A.S.M.E., recommended seven principal points of attack, including: "Maintaining or increasing the consumption of goods and services; balancing plant, machinery, and processes against production demands; balancing distribution agencies against consumer requirements; balancing man-power against production and distribution demands; controlling money and credit to satisfy the needs of government, business, and the individual; encouraging research activity to increase human well-being through development and progress in industry and business; balancing public works against public need."



A TABLEFUL

Partly machined high-pressure casing for one of two 160,000-kw. tanden-compound steam-turbine generators being manufactured at the Schenectady G.E. plant for the Brooklyn Edison East River Station

Aircraft Pioneers To Be Commemorated

Glenn Curtiss, Chance Vought, and Daniel Guggenheim will be commemorated in an aeronautic meeting to be held on Feb. 25 at the Engineering Societies Bldg., New York City, under the sponsorship of the A.S.M.E., Aeronautical Chamber of Commerce, National Aeronautic Association, A.I.E.E., A.I.M.E., A.S.C.E., and S.A.E. An illustrated lecture on Mr. Curtiss' aeronautic contributions will be given by Frank Russell, formerly vice-president of the Curtiss Aeroplane & Motor Co., and Captain John Towers of the U. S. Navy. Chance Vought's aeronautic achievements will be presented similarly by Commander E. E. Wilson, President of the Sikorsky Aviation Corporation. The encouragement to aeronautics made possible through the Daniel Guggenheim Foundation will be described by Admiral H. I. Cone of the U. S. Navy. Colonel V. E. Clark will preside. Opening remarks will be made by Roy V. Wright, President of the A.S.M.E. An unusual part of the meeting will be commemorative exhibits in the lobby of the building during the afternoon and evening.

Westinghouse Makes Appointments

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has made a number of appointments, effective Jan. 1. Thomas S. Perkins, formerly manager of supply engineering and consulting engineer, has been made general manager of distribution engineering and will represent S. M. Kintner, Assistant Vice-President, in his work with several departments. R. W. Owens, Manager of Industrial Motor Engineering, has been made general

R. W. Owens

manager of industrial engineering and will represent Mr. Kintner in another group of departments. W. M. McConahey has been appointed consulting engineer with headquarters in the Transformer Engineering Department of the Sharon (Pa.) works. H. V. Putnam

M. S. Hancock

succeeds Mr. McConahey as manager of the transformer engineering department. M. S. Hancock has been appointed assistant manager of the Industrial Motor Engineering Department and R. E. Marbury has been made assistant manager of the Supply Engineering Department.

Chemical Industries Plan Exposition

Machinery, apparatus, and equipment for the chemical industries will be included in three floors of exhibits planned for the Thirteenth Exposition of Chemical Industries at the Grand Central Palace, New York, from May 4-9. The machinery and apparatus will vary from laboratory equipment, supplies, and instruments through instruments of precision for recording temperature, pressure, volume, flow, and many other factors. In many cases, whole processes will be shown in operation. Attendance at the last Exposition was registered from 849 cities and towns in 46 states and three insular possessions, and from 94 cities and towns in 36 foreign countries.

During the two years since the last Exposition, great strides have been made in the commercialization and use of highly specialized alloys, and exhibits of this group will be included at the Exposition.

TWO pamphlets, "An Outline of Industrial Policies and Practices in Time of Reduced Operation and Employment," and "A Survey of Unemployment Relief in Industry," prepared for the President's Emergency Committee for Employment, have been released by the United States Government Printing Office.

NEW automobile models will hereafter be announced in November and December each year on a uniform date, according to a recent recommendation of the directors of the National Automobile Chamber of Commerce.

AMERICAN trade in manufactured goods last year held up better during the period of world depression than did the country's trade in unfinished and raw materials. For the entire year, according to a report of the Commerce Department, manufacturers made up slightly more than 50 per cent of American exports, as compared with 49 per cent of the total in 1929. American purchasers of foreign manufactures in 1930 were 25 per cent of the total, as compared with 22 per cent in 1929. The total value of semi-manufactures exported was $512,865,000 for 1930, as compared with $729,013,000 in 1929. That for manufactured commodities was $1,898,747,000, as compared with $2,531,823,000 in 1929. Imports of semi-manufactures was $608,123,000 for 1930, as compared with $885,051,000 for 1929. Manufactured commodities imports was $757,108,000 for 1930, as compared with $993,508,000 in 1929.

MERCHANT shipbuilding throughout the world during 1930 reached a higher volume of tonnage than during any year since 1921, which was the culmination of the war-time ship-building boom, and for the first time the tonnage of motorships exceeded that of all other types of ships launched, according to Lloyd's Register of Shipping. The world total launched last year was 2,889,000 tons, as compared with 2,793,000 tons in 1929 and 3,332,000 tons in 1913. Tonnage of motorships launched last year was 1,582,994, as compared with 1,269,888 for the world in 1929. A notable development was the rise of the United States from fifth to second place in volume of ships launched, with 246,687 tons to its credit. This is a tonnage gain for the U. S. of 120,000. Great Britain and Ireland lead the list with 1,478,563 gross tons launched during 1930, including 650,575 tons built for foreign countries, principally Norway.

GROUP 3, containing metallurgy, mechanics, and all types of machinery is the most important group at the Lyons International Fair, to be held from March 2 to 15 this year. This group occupies, for a length of over one mile, the showrooms on both sides of the avenue leading to the Fair Palace. Automobiles and their accessories occupy the whole of the central gallery of the Palace for a length of over half a mile, while motorcycles and bicycles occupy two galleries on the ground floor.

ACCORDING to the U. S. Department of Commerce, manufacturers of files and rasps sold 79 per cent, or $11,092,000 of total sales of $14,046,000, to wholesalers in 1929. The remaining sales were 15.2 per cent to users, and 5.8 per cent to retailers. This report includes sales by 33 manufacturing establishments.

BUSINESS ITEMS

The Barber-Greene Co., Aurora, Ill., has announced plans for additions which will practically double floor space. Changes in manufacturing operation policy which will make interchangeable certain features of various machines requiring the carrying of fewer assembly machines in stock, but a larger number of parts, necessitated addition of nearly 75,000 sq.ft.

The plant and offices of the General Implement Co., Evansville, Ind., and Racine, Wis., are being transferred to the Acme Body Co. plant at Aurora, Ill. G. L. Zink is general manager and chief engineer for the concern and is in charge of the transfer.

The Southern Pacific Co., San Francisco, recently announced the placing of orders for 63,764 tons of rail steel, costing approximately $3,000,000. Orders were placed with the Columbia Steel Co. and the Pacific Coast Steel Corporation, San Francisco, Calif., and the Colorado Fuel & Iron Co., Denver, Colo.

C. W. Marwedel has been appointed exclusive agent in Northern California for the Geometric Tool Co., New Haven, Conn. Marwedel maintains offices at 76 First St., San Francisco, and at 11th and Alice Sts., Oakland. R. S. Seiple, formerly with the Tool Equipment Co., will handle Geometric work for Marwedel.

The Dearborn Brass Co., Cedar Rapids, Iowa, has re-elected officers for the coming year. These include E. Corn, president; Harry Cohn, vice-president; L. W. Herdlicka, secretary, and C. E. Durey, treasurer.

The Frank Hamachek Machine Co., Kewaunee, Wis., has awarded the Austin Co., Cleveland, the contract for the design and construction of new plant units to replace present facilities. An investment of $75,000 is involved. The contract includes a foundry 80x60 ft. and a two-story machine shop 60x140 ft. Frank Hamachek is president.

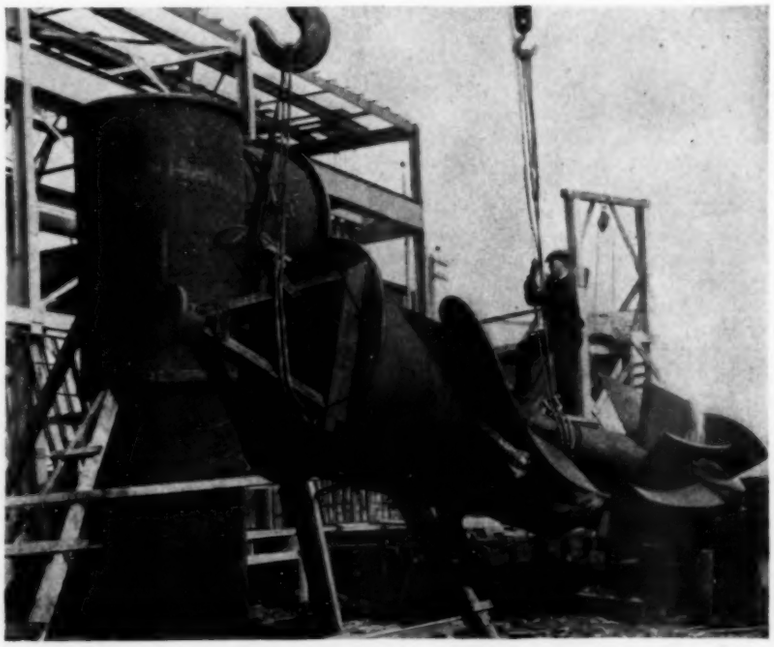
The Woodbury & Wheeler Co., Portland, Ore., has been appointed distributor of Westinghouse welding equipment in Portland.

The American Sheet Metal Works and the Pacific Blow Pipe Co., Portland, Ore., have recently consolidated, taking the name of American Sheet Metal Works and moving into new quarters at East 11th & Glisan St. H. Hedinger is manager.

The Pacific Machine & Manufacturing Co., Ltd., has been organized and capitalized at $75,000, by R. C. Hoyt, Oakland, Calif.; J. H. Gillard, Piedmont, Calif., and L. H. Pfaffenberger, Oakland. The manufacturing plant will be located at 4321 E. 10th St., Oakland.

Contracts for more than $750,000 have just been awarded to the Ertel Machine Co., Indianapolis, according to J. C. Ertel, head of the company.

The Minneapolis-Honeywell Regulator Co. will acquire the Tune-O-Stat Controls Co., through a stock exchange, providing stockholders approve by Feb. 15. Julius K. Luthe, President of Time-O-Stat, and Neil B. Dawes of Lane, Roloson & Co., Chicago, will become directors of Minneapolis-Honeywell.



Neither Battleship nor Dirigible

Shell and propeller of one of four booster pump units just before installation in the Ford River Rouge plant water-tunnel pump well. The tunnel will supply about a billion gallons of water per day

An assembly plant for the Universal Gear Corporation, Chicago, is being opened in Indianapolis. Building space amounting to 30,000 sq.ft. has been leased at Industrial Center. There, general offices, engineering offices, storerooms, and assembly plant will be housed.

The Globe Machinery & Supply Co., Inc., of Iowa, has leased 20,000 sq.ft. of floor space in the Seventh & Rockland Sts. Bldg., Philadelphia, Pa. The company will establish its eastern branch in Philadelphia.

Further evidence of the results of the recent tariff legislation in Canada is seen in the announcement by the James Morrison Brass Manufacturing Co. Ltd., of an arrangement with James P. Marsh and Co., and the Sargent Co. of Chicago for manufacturing their products in the Toronto plant of the Morrison Co., and marketing their lines in Canada and Great Britain.

The De Soto Motor Corporation has moved its general offices and part of the manufacturing department to the Chrysler Motors plant at Mt. Elliott Ave. & Lynch Road, Detroit. Production of the new De Soto Six will be carried on entirely in this plant.

The C. F. Laganke Co., Inc., Cleveland, Ohio, has moved its factory to 6545 Carnegie Ave. The new plant has more than double previous floor space.

The Winchester Arms Co., New Haven, Conn., one of the country's oldest and largest ordnance manufacturers, went into receivership on Jan. 22. The firm is claimed to be solvent, the action being purely precautionary.

The Illinois National Supply Co., Indianapolis, Ind., has been appointed exclusive Indiana distributor for the Federal Press Co., Elkhart, Ind.

The proposed merger between the Fageol Motors Co., Oakland, Calif., and the Moreland Truck Co., Burbank, Calif., will not take place.

Botwinik Brothers, Inc., 67 Water St., New Haven, Conn., has moved its New York office from 30 Church St. to larger quarters at 249 Centre St. A. A. Johnson will be in charge and Fred Stuart will assist him.

The Goodell-Pratt Co., Greenfield, Mass., and the Millers Falls (Mass.) Co., small tool manufacturers totaling a capital of $3,997,700, plan to merge. William P. Pratt and Philip Rogers are the respective presidents. It is planned to operate as two separate units under a consolidated organization.

The Moise Steel Co., Milwaukee, has moved its offices to South Fortieth & West Scott Sts.

The Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, has appointed the James H. Knapp Co., 4920 Loma Vista Ave., Los Angeles, as exclusive Pacific Coast distributor for its industrial products.

The Caterpillar Tractor Co., Peoria, Ill., has received a $254,000 government order for tractors and graders.

The Yale & Towne Manufacturing Co, Stamford, Conn., will transfer two departments from Stamford to Philadelphia, a part of the builders' hardware business to North Chicago, and the executive offices to New York City. Thereafter the Stamford plant will be rated as a branch. The purpose is to concentrate at Philadelphia all material handling equipment departments and will cause the moving of over $1,000,000 of property.

The Scovill Manufacturing Co., Waterbury, Conn., through its subsidiary the Hamilton Beach Co., is concluding plans for the purchase of the Arnold Electric Co., Racine, Wis., having a capital of $100,000. Scoville has recently purchased the O. K. Manufacturing Co., Oswego, N. Y., and Gilchrist Co., Newark, N. J., and plans centering those operations at Waterbury.

L. H. Zintgraff, 907 Security Bldg., St. Louis, Mo., has been appointed sales representative in that territory by the Allied Die Casting Corporation, Long Island City, N. Y.

The Joseph Greenspon's Sons Iron & Steel Co., 3130 North Hall St., St. Louis, Mo., which purchased the Sharon Steel Co., Wheatland, Pa., in 1926, has sold the firm to the A. B. Small Co., Philadelphia.

The Eby Machinery Co., 35-41 Main St., San Francisco, has been appointed dealer for Allis-Chalmers industrial and agricultural crawler and wheel-type tractors, with equipment and implements.

The Marshall & Huschart Machinery Co., 571 Washington Blvd., at Jefferson, Chicago, Ill., has been appointed exclusive Chicago representative for the Federal Press Co., Elkhart, Ind.

PERSONALS

J. M. Adams has been named works manager of the Wyckoff Drawn Steel Co., Ambridge, Pa.

Raymond K. Albright, Executive Manager of the Buffalo (N. Y.) Bolt Co., since 1905, and treasurer since 1921, has been elected president to succeed the late Ralph Plumb. Mr. Albright will retain his office as treasurer. Ralph Hudson Plumb has been elected a director. J. J. McLaughlin was elected vice-president in charge of operations and Proctor Carr vice-president in charge of sales.

Irving C. Bolton, Treasurer of the Warner & Swasey Co., Cleveland, has been elected a director to succeed Clifford E. Dangler, resigned. Other directors were re-elected.

Jean Borotra, French tennis star, has become a member of the board of directors of the Lower Rhenish Iron Foundries & Machinery Co., Paris.

William S. Brashear has been elected president and general manager of the Barnard & Leas Manufacturing Co., Moline, Ill., to succeed A. R. Wiegel.

George W. Bunner, General Superintendent of the Warner Gear Co., Muncie, Ind., for the past six years, has been made works manager. J. O. Moore, formerly assistant general superintendent, has been made general superintendent to succeed Mr. Bunner.

T. F. Connors has been transferred to the Memphis, Tenn., plant of the American Fork & Hoe Co., Cleveland.

Dr. Frank Conrad, Assistant Chief Engineer of the Westinghouse Electric & Manufacturing Co., received the 1930 Edison medal of the A.I.E.E. for outstanding achievement in the field of electricity.

S. M. Bunting, for many years manager of the Miscellaneous Department, of the Niles, Bement, Pond Co., New York City and Hamilton, Ohio, has been appointed sales manager of the Automatic Machine Co., Bridgeport, Conn.

Dr. C. L. Cummer has been elected a director of the Ferry Cap & Set Screw Co., Cleveland. He will succeed Paul North. Other directors and officers were re-elected.

A. Duperron, Chief Engineer of the Montreal Tramways Commission, has been elected chairman of the Montreal branch of the Engineering Institute of Canada.

O. I. Ehresman has been named president of the H. P. Deuscher Foundry Co., Hamilton, Ohio. Other officers include W. H. Stephan, vice-president, and Earl H. Thompson, secretary-treasurer.

J. H. Fortier, a director of the Eastern Canada Steel & Iron Works, Quebec, has been elected to the board of the Shawinigan Water & Power Co. to fill the vacancy created by the death of J. L. Perron.

K. H. Gayle, Jr., affiliated with the Ingalls Iron Works Co. at Verona, Pa., for the past year in a sales capacity, has been transferred to the New York office.

Joseph Gould was re-elected president of the Steel Stamping Co., Lorain, Ohio, at the recent annual meeting. Other officers include Alex Altfield, vice-president; T. C. Metzger, treasurer; Harry Bregman, secretary-manager, and Edward Gould, sales manager.

L. A. Graham, formerly vice-president and sales manager of the Relay Motors Corporation, Lima, Ohio, has become vice-president of the Freeze-Vogel-Crawford, Inc., Milwaukee.

Walter D. Griffith has been appointed superintendent of the Carnegie Steel Co., McDonald plant, Youngstown, Ohio, to succeed Carl W. Meyers, who has been made superintendent of the Republic Steel Corporation's bar mill operations in the Chicago district.

Claus Greve, founder and formerly president of the Cleveland (Ohio.) Pneumatic Tool Co., has been elected chairman. L. W. Greve, formerly treasurer, has been named president to succeed his father; John DeMooy has been elected treasurer; H. W. Foster, re-elected vice-president; H. C. Covey, secretary; and Arthur Scott, superintendent.

W. C. Grunow was relieved on Jan. 23 of the presidency of the Grigsby-Grunow Co., Chicago, and the Majestic Household Utility Corporation, an associate company. He is succeeded in both positions by B. J. Grigsby, who was chairman of the board and president of the companies until a year ago, and who will serve also as chairman again. Don M. Compton was named vice-president and treasurer of both companies, Vernon A. Callamore was elected general sales manager of both, and Albert O. Weiland production manager for both.

Milton L. Hersey has been appointed president of the Canadian Tube & Steel Products, Ltd., Montreal, to succeed the late James L. Waldie. Charles M. Thomson has been appointed vice-president in charge of manufacturing.

W. B. Higgins, Vice-President of the Wheeling (W. Va.) Steel Corporation has resigned, following closely upon the resignation of I. M. Scott, formerly president.

Charles L. Lawrance, former president of the Wright Aeronautical Corporation and designer of the Wright Whirlwind engine, was elected president of the Aeronautical Chamber of Commerce for 1931, to succeed Frederick B. Rentschler, President of the United Aircraft & Transport Corporation, head of the Chamber for the past two years. The election was held at the annual meeting of the organization on Jan. 29.

S. T. Nelson will resign on May 1 as works manager of the Sullivan Machinery Co., Elkhart, Ind., after 45 years with the company. He has assigned 28 inventions to the company.

P. H. Noland has been appointed general manager of the Marmon Motor Car Co., and has also been elected to the company's directorate.

Carl A. Salmonsen, formerly superintendent of Section K of the General Electric Co., Schenectady, N. Y., has been made works manager of the Canadian General Electric Co., at Peterborough, Ont. He has been acting superintendent of the Peterborough works since August, 1928, and succeeds E. G. Patterson, who retired after 41 years.

C. M. Williams has been appointed Indianapolis resident salesman for the Pittsburgh (Pa.) Crucible Steel Co. J. A. Ross, Secretary, will succeed him at Pittsburgh and Mr. Ross will be succeeded by F. N. Joyce, formerly located at the company's plant at Midland, Pa.

Robert Lee Wilson, Assistant to the President of the Westinghouse Electric & Manufacturing Co., has resigned after 37 years with the company. While he will devote himself principally to his private affairs, he will be retained by Westinghouse on call in a consultative capacity.

The world's first specimen of distilled chromium in the hand of L. W. Chubb, Director of the Westinghouse Research Laboratories. It was distilled in a high vacuum, one ten-thousandth of a millimeter, at a temperature about 20 times that of boiling water

OBITUARIES

Lucien Sharpe, 59, formerly connected with the Brown & Sharpe Manufacturing Co., and brother of Henry D. Sharpe, president of that company, died in France on Jan. 26.

William D. Bartlett, 57, Senior Vice-President of the Thompson Products Co., Cleveland and Detroit, died on Jan. 30 in Cleveland. He had been with the company for 29 years, and was the developer of the Bartlett process of heading automobile engine valves.

Frank I. Pearce, 86, one of the founders of the Link-Belt Co., Chicago, died on Jan. 28 in Hollywood, Calif.

Jasper Bennette, 83, inventor of various types of agricultural and sewing machines, died at Tiffin, Ohio, on Jan. 24.

Horace Wesley Clark, 59, head of the H. W. Clark Co., Mattoon, Ill., died on Jan. 19 after a long illness. He had invented over 50 meters and appliances, having perfected his first water meter in 1902.

John T. Cullen, Sr., 72, for 45 years identified with industrial projects in Clinton, Ill., founder of the Star Boiler Works, which later became the Cullen Co., died on Jan. 19 in Davenport, Iowa, as a result of pneumonia, following injuries sustained in an automobile accident.

Harry Darlington, Jr., 43, a director of the Follansbee Brothers Co., the Macbeth-Evans Glass Co., the Pittsburgh Steel Foundry Corporation and Pittsburgh Forge & Iron Co., died of pneumonia in Pittsburgh on Jan. 25.

Arthur T. Doud, Louisville Works Manager for the Reed Air Filter plant of the American Air Filter Co., died in Louisville on Jan. 20. He had been associated with the company for the past 3½ years.

Charles Dickey Dyer, 72, formerly vice-president of the Shenango Furnace Co., Pittsburgh, Pa., died at Ben Avon, Pa., on Jan. 22. He retired in 1928.

Howard Evans, 78, whose entire business career was spent with J. W. Paxson Co., Philadelphia, and who retired recently, died in that city on Jan. 21.

Carlton B. Coe, Secretary of the Steele & Johnson Co., Waterbury, Conn., died unexpectedly on Jan. 21. He was a brother of John A. Coe, President of the American Brass Co.

John Davey, superintendent of the Canton (Ohio) Tin Plate Corporation, died of pneumonia at his home in Mansfield, Ohio, on Jan. 25.

Charles A. Gutenkunst, 72, President and Treasurer of the Milwaukee Malleable & Grey Iron Co., and of the Milwaukee Hay Tool Co., died on Jan. 17.

August M. Herrmann, 68, retired iron manufacturer, died on Jan. 20 at Hackensack, N. J.

James H. Hooker, 72, President of the Sinker-Davis Co., Indianapolis, Ind., died recently.

Alfred E. Howell, formerly manager of the Somerville (N. J.) Stove Works, died unexpectedly at Nashville, Tenn., on Jan. 25.

Ray L. Lambert, 44, Vice-President of the Lambert Art Metal Co., Inc., Columbus, Ohio, died recently.

John Franklin Lewis, 68, formerly assistant general superintendent of the Edgar Thomson works of the Carnegie Steel Co., Pittsburgh, Pa., who had served the company for a half century before his retirement in 1925, died on Jan. 26 at his home in Pittsburgh.

James A. Morrison, President of the James Morrisson Brass Manufacturing Co., Ltd., Toronto, Ont., died in that city on Jan. 26 after an illness of a year.

Archibald Bannatyne, 78, originator of the dollar watch which later became the Ingersoll, at one time master mechanic, Waterbury Clock Co., at Waterbury on Jan. 29.

Frederick H. Stevens, former chairman of the board of the American Locomotive Works, who retired from active business about a year ago, died unexpectedly on Jan. 23 at San Marino, Calif.

George F. Stewart, Sr., 65, former president of the Bradford Machine Tool Co., died on Jan. 24.

Harold C. Suman, 46, Assistant to the Manager of the Otis Elevator branch in Quincy, Ill., died suddenly on Jan. 22. He had been with the Moline (Ill.) Elevator Co., for 10 years prior to that firm's acquisition by Otis.

Henry D. Winton, 74, who had been with the Hersey Manufacturing Co., East Boston, Mass., for 45 years, lately as secretary, died on Jan. 23 in Boston.

Franz Wollaeger, 84, Treasurer of the John Pritzlaff Hardware Co., Milwaukee, died on Jan. 18. He had been associated with the company for almost 60 years.

FORTHCOMING MEETINGS

FIFTH MIDWESTERN POWER & ENGINEERING CONFERENCE AND EXPOSITION —Chicago, Feb. 10-14, 1931. G. E. Pfisterer, 53 West Jackson Blvd., Chicago, secretary.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS — 140th annual meeting, Engineering Societies Bldg., New York, N. Y., Feb. 16-19. Headquarters, 29 West 39th St., New York, N. Y.

WESTERN METAL CONGRESS AND EXPOSITION—Second National, Civic Auditorium, San Francisco, Calif., Feb. 16-20, 1931. Under auspices of A.S.S.T. W. H. Eisenman, secretary, 7106 Euclid Ave., Cleveland, Ohio.

STEEL FOUNDER'S SOCIETY OF AMERICA—Sales clinic and regular meeting, March 19-20, Neil House, Columbus, Ohio. G. P. Rogers, Managing Director, 932 Graybar Bldg., New York City.

THREE-M-CONGRESS — Management, Maintenance, and Materials Handling Congress and Second National Industrial Equipment Exposition, Cleveland, Ohio, April 13-18, 1931. In the Arena and Exhibit Hall, Cleveland Public Auditorium. Information from the A.S.M.E., 29 West 39th St., N.Y.C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Calvin W. Rice, executive secretary, 29 West 39th St., New York.

The following meetings are scheduled:

Semi-Annual meeting, Birmingham, Ala., Apr. 20-23, 1931.

National Aeronautic Meeting, Baltimore, Md., May 12-14, 1931.

National Applied Mechanics Meeting, Purdue University, Lafayette, Ind., June 15-16.

AMERICAN FOUNDRYMEN'S ASSOCIATION—Annual convention and exhibition, Stevens Hotel, Chicago, May 4-8, 1931, C. E. Hoyt, 222 West Adams St., Chicago, secretary.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION—Annual Spring Meeting, Hotel Statler, Buffalo, May 7-9, 1931. T. W. Owen, 3608 Euclid Ave., Cleveland, secretary.

NATIONAL FOREIGN TRADE COUNCIL —Annual Convention, May 27-29, at the Hotel Commodore, New York City. O. K. Davis, secretary, 1 Hanover Square, New York, N. Y.

AMERICAN MANAGEMENT ASSOCIATION—Annual Conference, Production Division, Rochester, N. Y., June 1-2, (approximate, exact dates later). Theme "Control of Manufacturing Overhead." Headquarters, 20 Vesey St., N. Y. C.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual Meeting, Stevens Hotel, Chicago, June 22-26. C. L. Warwick, 1315 Spruce St., Philadelphia, is secretary-treasurer.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine tool business

NEW YORK

The situation in general is about that of last week. Several of the larger and more aggressive houses had a good week's business, one having the best week in 18 months, another a week equal to the preceding one and a month better than any since last April. All dealers report a number of orders dangling just out of reach through the perversity of capital, which has adopted an attitude of "whether we need 'em or not, not a nickel for tools until conditions improve noticeably." Yet reports of better conditions grow more and more common. Both General Electric and Westinghouse are busy on refrigerator work, American Can is said to have orders for a year and a night force going, and several reports of big orders have come to hand. Inquiries are at least holding their own, and in some cases are improving, while used tool sales are better. Some dealers are maintaining sales totals with school and municipal orders.

PACIFIC NORTHWEST

Improved sentiment is evidenced by a more hopeful state of mind and increased inquiry. Depression and inactivity in the lumber industry are leaving their mark. Industrial activity is limited, and buying is confined to essential replacements. Some houses are confining their efforts to the road machine, precious metals, and hydro-electric fields, where there is more interest than in industrials. Factories manufacturing canning machinery report the situation problematical. Lumber producers are, however, more hopeful, and should this industry revive, the effect will be felt by tool and shop equipment houses throughout the Northwest. No large inquiries are in the market except for some shop equipment for the Puget Sound Navy yard, including two horizontal boring, drilling, and milling machines. Inquiry is also out for a vertical mill as well as for several lathes and three turret lathes.

CINCINNATI

Manufacturers are trying hard to accelerate the slow-going business vehicle, but it is found impossible to make much headway over the present rutty and bumpy market roads. Selling agents report very few orders closed, but feel that pending business is about to reach the buying stage. Business booked was largely confined to single tools and replacements, orders coming from miscellaneous users. One concern reported that it is having an increased call from automobile repair shops for specialties, including small lathes and also gears and other parts. A good number of inquiries were received from miscellaneous users, whose requirements with few exceptions were single tools and replacements.

DETROIT

Michigan is more optimistic than it has been in many months. Machinery and machine tool dealers are slowly becoming convinced that the depression of the last 15 months is passing into history and that 1931 will be substantially better than 1930. Automobile manufacturers are making plans for increased programs and increased expenditures and in general there is evidence that the corner has been turned.

For most of the equipment dealers the month of January was very much better than December, and February is calculated to be better than January. Of course, December is never a very good month. Prospects for February are excellent, however. The large automobile concerns are really making plans to buy machinery in fairly large volume and there are enough replacements being considered to make a fair year. Inquiries are increasing.

■

BUSINESS CONDITIONS and love have much in common; both are itches difficult to scratch. Dealers and manufacturers are, however, scratching to continue the improvement that has evidenced itself since the first of the year. The feeling is expressed that conditions will have definitely turned for the better if the present rate of improvement can be continued through February. Prospects are still attempting to get machines without spending money; a number of orders okayed by shop executives are now awaiting capital's signature, while capital, just back from a "Boost Business" meeting, refuses to sign.

NEW YORK'S market is undecided, the larger and more established houses having a good week, the others reporting slowing up or no change. Pacific Northwest inquiry is up, but the slowness of the lumber industry is still hampering tool sales. Among the inquiries is a list from the Puget Sound Navy Yard. Cincinnati inquiries are also good, though business itself is about as it was. A few orders from auto parts makers are coming in. Detroit reports general optimism and a feeling that the corner is turned.

CHICAGO shows no material change. The Santa Fe has issued supplemental lists, and the Illinois Steel is inquiring also. Canada expects definite gains from the resumption of industrial action, with railways and textile companies buying tools. New England still progresses, with small tool orders and sales of drills and lathes still leading. Indianapolis business is also up, partly as a result of the automobile shows, partly from the furniture and contracting interests.

CHICAGO

No material change has occurred. Inquiries continue in good volume, and, in the main, are of a nature indicating early closing. The Santa Fe railroad has issued lists of shop equipment needs supplemental to those reported a week ago, about 12 items being specified. Thus far this year, this road is the only one to enter the market with an extended list. Other railroads are said to be preparing lists. The Illinois Steel Co. is again in the market for a number of tools for its new shops, lathes and shapers being the principal items. Demand for small machinists' and mechanics' tools, which took an upward turn shortly after January opened, has fallen off. A report from that the new Lane Technical High School will not be in a position to ask for bids on equipment this year has caused some disappointment. Roughly estimated, about $500,000 will be expended by the Board of Education to equip this school completely.

CANADA

More cheerful sentiment regarding the course of industrial activity, in evidence since the turn of the year, is beginning to be translated into actual gains. Among the most encouraging occurrences, from the metal-working point of view, during the last fortnight, were the resumption of operations in a number of manufacturing plants, the placing of further orders for 1931 requirements by railroads, and the recalling of nearly 5,000 workers by a producer of popular priced automobiles. General improvement is further reflected in the announcement that the demand for tool makers and designers resulted in a greater increase in industrial employment in Ontario for the third week of January than for either of the first two weeks.

Car and locomotive plants are making substantial purchases of machinery while tool manufacturers report an increasing demand from the electrical industry. The textile industry, which is staging a remarkable come-back, is also proving a good market for machinery and tools. While the iron and steel industry generally shows little increased activity, the plants of the Dominion Steel & Coal Corporation are busy on orders from the Canadian National Railways for 34,000 tons of 130-lb. rails. Canadian Fairbanks-Morse Co., Ltd., reports a steady demand for radio equipment and automobile accessories, but a falling-off in sales of agricultural and mining equipment.

NEW ENGLAND

New England continues a slow-motion style of progress. Machine tools, naturally, are still far below normal, and January improvement was mainly due to a very subnormal level of business in December. Leaders in the field anticipate January shipments will average 10 or 15 per cent ahead of December.

During the current week, an interesting volume of orders under the $5,000 class were booked. Lathes and drills were again well represented.

Dealers in rebuilt machinery did creditably, and the week showed good inquiry promise. One dealer reported his best week in a number of months. Houses are exceptionally well supplied with a fine line of standard reconditioned tools. A Chicopee (Mass.) knitting machine company disposed of its full equipment during the week, and additional good machine tools were thrown on the market.

INDIANAPOLIS

Machine tool business is picking up slightly. The volume of business done during January is expected to exceed that of a year ago, though the different markets remain spotted. However, there is not the discouragement manifest that there was a year ago. One encouraging feature is the fact that most of the railroads having shops in this state have put more men to work. Their purchases are confined to isolated items and no general lists are on the market yet.

A fair demand for special machinery is coming from the furniture trade with indications of a good volume of spring sales. Mid-winter markets were satisfactory, and most Indiana furniture manufacturers have increased production rapidly. One big source of sales during the next three months is the contractors. More hard-surface roads will be built this year in Indiana than ever before, and last year contractors held their purchases below the contractors held purchases below average.

A large amount of small garage equipment should be sold this year, particularly to bus interests. The utilities, particularly electric and gas, have announced expansion programs.

BUSINESS • BAROMETER

Speculative instincts are now repressed and business may continue quiet until these inhibitions are relieved

THEODORE H. PRICE
Editor, Commerce and Finance, New York

QUIETUDE and stability were the outstanding attributes of last week's markets. Stocks and bonds were a little easier, but at declines offerings are small and the showing of the market is encouraging. The improvement during the past four weeks, which has been especially noticeable in bonds, is largely due to the continued cheapness of money. It is leading a great many bankers and capitalists to buy high-class securities, and the supply of impeccable investments is being rapidly absorbed.

But money is not yet perceptibly dearer and as long as it can be borrowed on call at from 1 to 1½ per cent it will be a backlog that will keep the flames of speculation alive until something happens to increase the draught on which most fires thrive.

Meanwhile there seems to be an increase of optimism, and people are more disposed to notice the bright spots than they were. As an example of this we may mention a page advertisement published by the Minneapolis Tribune in the New York City papers. As a specimen of the facts thus advertised the following may be quoted: "The wheat crop harvested in Minnesota, the Dakotas, and Montana brought in 1929, a fairly normal year, $178,465,000; but the income from cattle, hogs, poultry and sheep totaled $807,549,000, or more than four and one half times the income received from wheat." Space limitations make it impossible to quote at greater length, but the advertisement ought to be read by everyone who seeks a knowledge of the facts which are now very much obscured by political considerations.

Unemployment is another question that should be carefully considered before any definite statements are put into circulation. An industrial unemployment roll of between 4,500,000 and 5,000,000 persons for the first week of December is estimated for the United States on the basis of a survey conducted for the President's Emergency Committee. These figures seem large but it is explained that their foundation is a report which covers a total of 213,000 families, including 355,000 wage or salary earners.

In dealing with the averages derived from these figures it is very easy to make an error, and many large employers of labor are now in doubt as to whether there is as much unemployment as had been earlier assumed. Certainly the wage fund that has been placed at the disposal of the various relief committees is an enormous one, and adequate provision for all those who seem to be really in need appears to be available.

The outlook otherwise is satisfactory. The commodity markets have not moved much, but they are steady and many shrewd judges are now providing themselves with the merchandise that they will need for their spring and summer trade. The political situation in Washington is causing some apprehension, but it is not serious, and the odds now seem to be against a special session of Congress.

The news from abroad is particularly satisfactory as it seems to imply the re-establishment of tranquillity in India and an improved demand for the goods which the Orient consumes. The news from China is also encouraging, but no one can be quite sure of its reliability, although the merchants who do business with the great Chinese markets seem to be more confident of peace.

The Chadbourne agreement promises to keep the sugar market steady for some months ahead, and conditions in Cuba appear to be improving, although reliable news from the Island is somewhat difficult to obtain. The cotton market has been surprisingly steady and the cotton goods market has shown no little firmness on the execution of orders for certain staple goods of which the trade seems to be bare.

In our domestic steel industry a slight improvement is reported, and the automobile manufacturers insist that the potential demand for cars is much larger than is usual at this time of the year.

It is reported that the New York Motor Show was a great success, and that the exhibition now being held in Chicago is attracting wide attention.

Sixty-seven major American railroads report a decrease of 30.1 per cent in their net earnings for December, and the year's decline is put at about 24 per cent. But the railroad men are no longer disturbed by these figures. They say the decrease shown is largely due to the competition of automobile trucks and cars, and includes much of the short-haul business that the railroads used to regard as unprofitable. Perhaps the prospect that the railroads will ultimately be consolidated has silenced most complainers, at least for the present.

The speculative instinct that takes possession of most Americans from time to time seems to have been successfully repressed just now, and many scars would be speedily healed if business could be kept on an even keel for the next six months. This is unlikely, for it is plain that the spirit of hope is commencing to re-assert itself, and a revival of speculative as well as commercial activity is possible provided the expanding tendency of trade is not checked by some unlooked-for happening.

THE BUSINESS WEEK

February 4, 1931

Improvement is painfully slow. . . . This is disappointing to those looking for miracles without understanding how they are produced; but in the longer view the absence this year of a swift rebound from the December bottom is encouraging in a left-handed way. . . . Our index has dropped a little this week, but still moves on a level a few points above December. . . . The rise in steel activity is slowing down, but merchandise carloadings suggest increasing movement of finished goods to depleted inventories, building contracts and power production continue to resist further decline; only money turnover, as reflected in bank debits and currency in circulation, has dropped a bit, and the latter has its favorable side, indicating greater public confidence in the banks. . . . More rapid improvement, under existing conditions, would be "phoney." . . . Nothing that could be done to hasten it has been done or is being done anywhere. . . . The deflationists are now dominant in every aspect of public and private policy. . . . Federal Reserve credit is being steadily contracted, the cost of long-term capital remains high, the bond market is still highly uncertain, uneconomic gold movements continue, the liquidation process goes on, commodity prices still drift downward, the domestic political outlook grows worse. . . . Under such conditions improvement depends solely upon increase of consumer replacement demand, and is bound to be slow, because it's largely up to the stork—a slow bird.

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

A FIRMER price situation prevails in non-ferrous metals this week, with upward movements in solder, babbitt and slab zinc. Copper wire is down about ½c. per lb., to 11¾c., mill base, New York. Rivets, rubber belting and linseed oil tend downward, mostly in warehouse lots, while advances have developed in cutting oil at eastern points. Steel demand is increasing gradually in automotive, structural and pipe-line requirements. Railways, on the other hand, appear to be taking less metal than they did a few weeks ago.

(*All prices as of Jan.* 30, 1931)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI:	
Ala. Foundry (Silicon, 1.75@2.25)	$14.19@$14.69
Tenn. Foundry (Silicon, 1.75@2.25)	14.19@ 14.69
NEW YORK:	
Buffalo No. 2 Fdry. (Silicon, 1.75@2.25)	20.41@ 20.91
BIRMINGHAM:	
No. 2 Foundry (Silicon 1.75@2.25)	13.00@14.00
PHILADELPHIA:	
Eastern Pa., No. 2x (Silicon, 2.25@2.75)	18.26@ 19.26
Virginia No. 2 (Silicon, 1.75@2.25)	22.29
Basic	17.25@ 17.50
CHICAGO:	
No. 2 Foundry, Northern (Silicon, 1.75@2.25)	17.50
No. 2 Foundry, Southern	17.51
PITTSBURGH: (including freight charge, $1.76, from Valley)	
No. 2 Foundry	18.76
Basic	18.76
Bessemer	19.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00
Cleveland	4.75
Cincinnati	4.45
New York	4 75@5.00
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.90	3.35†	3.00	3.40†
No. 12	1.95	3.45†	3.10	3.45†
No. 14	2.05	3.55†	3.20	3.50†
No. 16	2.15	3.65†	3.30	3.60†
Black				
Nos. 18 to 20	2.15@2.25	3.60†	3.40	3.70
No. 22	2.30@2.40	3.75†	3.55	3.85
No. 24	2.35@2.45	3.80†	3.60	3.90
No. 26	2.45@2.55	3.90†	3.70	4.00
No. 28	2.60@2.70	4.05†	3.85	4.15
Galvanized				
No. 10	2.20@2.30	3.65†	3.50	3.55
Nos. 12 to 14	2.30@2.40	3.75†	3.60	3.65
No. 16	2.40@2.50	3.85†	3.70	3.75
No. 18	2.55@2.65	4.00†	3.85	3.90
No. 20	2.70@2.80	4.15†	4.00	4.05
No. 22	2.75@2.85	4.20†	4.05	4.10
No. 24	2.90@3.00	4.35†	4.20	4.25
No. 26	3.15@3.25	4.60†	4.35	4.50
No. 28	3.40@3.50	4.85†	4.70	4.75

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—B.w.g. and Decimal	Fractions	Outside Diameter in Inches: ½	⅝	¾	⅞	1	1⅛	1¼
		Price per Foot						
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095″	13	.21	.23	.25	.26	.27	.29	.31
.109″	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125′	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	7.00	6.00	6.15
Hoop steel	3.75†	4.00	3.75†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin,, flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	2.95	3.00†
Soft steel bars	3.10†	2.95	3.00†
Soft steel bar shapes	3.10†	2.95	3.00†
Soft steel bands	3.40†	3.20	3.20†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	65%	55%	50%

*Flat, $\frac{3}{16}$-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—$\frac{3}{32}$, 8.35c. per lb.; ⅛, 7.85c. per lb.; $\frac{5}{32}$ to ¼, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			11.00@11.50
Tin, Straits, pigs, New York			29.00@30.00
Lead, pigs, E. St. Louis	4.55	New York	5.87½ @6.87½
Zinc, slabs, E. St. Louis	4.05	New York	5.50 @ 6.50

	New York	Cleveland	Chicago
Antimony, slabs	10.00@10.50	10.50	10.75
Copper sheets*	19.75	19.75	19.75
Copper wire*	11.75	11.87½	11.87½
Copper, drawn, round*	18.25	18.75	18.25
Copper tubing*	22.12½	22.12½	22.12½
Brass sheets, high*	17.12½	17.12½	17.12½
Brass tubing, high*	22.00	22.00	22.00
Brass rods, high*	15.37½	15.37½	15.37½
Brass wire, high*	17.62½	17.62½	17.62½

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	24.00@25.00	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.36
Solder (½ and ½)	22.25	21.50	18@20

Babbitt metal, delivered in case lots, New York, cents per lb.:

Genuine, highest grade	46.00
Commercial genuine, intermediate grade	34.00
Anti-friction metal, general service	30.00
No. 4 babbitt, f.o.b.	10.00

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	8.00	8.25	7.25@ 7.75
Copper, heavy, and wire	7.50	7.75	6.75@ 7.25
Copper, light, and bottoms	6.75	7.00	6.00@ 6.50
Heavy lead	3.50	4.00	3.00@ 3.50
Lead battery plates	1.50	2.00	2.00@ 2.50
Brass, heavy, yellow	4.50	4.75	4.00@ 4.50
Brass, heavy, red	7.25	8.00	6.25@ 6.75
Brass, light	3.50	4.00	3.50@ 4.00
No. 1 rod-brass turnings	4.75	5.00	4.25@ 4.75
Zinc	1.50	1.50	1.25@ 1.50

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.10
Wiping cloths, washed, white, per lb.	.15	38.00 per M	.14½
Sal soda, per lb.	.01¾	.02	.02
Roll sulphur, per lb.	.028	.03	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.094	.099	.098
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.75	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	35%
Med. grade, heavy wgt.	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	60%	50–10%	60%
Second grade	60–5%	60– 5%	65%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.031	$0.0325
Cold fin. shafting	per lb.	.034	.034	.035
Brass rods	per lb.	.1537½	.1612½	.2125
Solder (½ and ½)	per lb.	.2225	.215	.29
Cotton waste, white	per lb.	.13	.13	.13
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.	per 100	4.59	4.59	4.59
Lard cutting oil	per gal.	.75	.65	.65
Machine oil	per gal.	.33	.33	.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	65%	65%	50–10%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	1.00	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.40@2.50
Coke, prompt foundry, per net ton	Connellsville,		3.25@4.85
White lead, dry	100 lb. kegs	New York,	13.25
White lead, in oil	100 lb. kegs	New York,	13.25
Red lead, dry	100 lb. kegs	New York,	13.25
Red lead, in oil	100 lb. kegs	New York,	14.75

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from latest list, dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less	65–10%
Larger, up to 1 x 30-in., full kegs, list less	65–10%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	65–10%
Larger, list less	65–10%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.25
Structural, round head, broken kegs, net	5.75
Tank, $\frac{7}{16}$-in. dia. and smaller, list less	60–10%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	65–10%
Larger, up to 3-in., list less	65–10%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$3.50
Wrought, broken kegs, per 100 lb., list less	1.50
Turnbuckles:	
With stub ends, list less	20–10%
Without stub ends, list less	55%
Chain:	
Proof coil, base, per 100 lb., net	$8.50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Ill., Rock Island—City, C. Thompson, Mayor, City Hall—will soon receive bids for a new gasoline motor locomotive crane with minimum lifting power of 10,000 lb. and specified maximum lifting power of 30,000 lb. for river rail terminal. $14,000.

Mass., Chelsea—Keirnan Co., 16 5th St.—electric floor sanding machine.

Opportunities for Future Business

Ala., Cullman—Malchow & Sons Box & Crate Mfg. Co., plans to rebuild a 1 story, 40 x 170 ft. plant recently destroyed by fire.

Ariz., Phoenix—P. Bennett Auto Supply Co., 328 North Central Ave., is having preliminary plans prepared for the construction of service buildings, service court, etc. Estimated cost $100,000. Lescher & Mahoney, First National Bank of Arizona, Archts.

Calif., Elk Grove — Batey Bros., awarded contract for the construction of a 50 x 70 ft. machine shop.

Calif., Los Angeles—Benedict & Co. Ltd., c/o W. P. McNeil Co., 4814 Loma Vista Ave., awarded contract for a 1 and 2 story factory and warehouse for the manufacture of Yukon domestic and commercial refrigeration equipment. Estimated cost $300,000. Noted Dec. 11.

Calif., Richmond—Atchison, Topeka & Santa Fe Ry. Co., 6th and Main Sts., Los Angeles, awarded contract for a 1 story shop here. Estimated cost $50,000. Noted Jan. 29.

Calif., Santa Rosa — Pacific Gas & Electric Co., 245 Market St., San Francisco, is receiving bids for a group of service buildings, including transformer house, garage, shops, meter house, etc., here. Estimated cost $60,000.

Conn., Hartford—New England Electric Co., 103 Allyn St., awarded contract for the construction of a service station at Spring and Church Sts. Estimated cost $75,000. Maturity in Spring. Noted Dec. 25.

Fla., Miami—International Aeronautical Industries, H. L. Pierce, Trustee and V. Pres., and affiliated organizations, reported plans under way for the construction of an airport, including hangar, machine shop, etc. Estimated cost $650,000.

Fla., Sebring—E. T. Young, plans to rebuild 1 story, 60 x 130 ft. sawmill and yard recently destroyed by fire. Estimated cost $24,000. Private plans.

Ga., Austell—Clark Thread Co., 2600 Ogden St., Newark, N. J., will receive bids until Feb. 10 for the construction of a thread mill (first unit), 3 story, 498 x 133 ft. to house 40,000 spindles, 2 story, 50 x 100 ft. warehouse, 50 x 100 ft. opener room building, machine shop, 1 story boiler room here. Initial cost $2,000,000. Ultimate total cost $12,000,000. J. G. Sirrine & Co., Greenville, S. C., are architects and engineers. Noted Jan. 15.

Ill., Chicago—Harper Wyman Co., 1364 East 70th St., manufacturers of gas range supplies, awarded masonry and carpentry contracts for a 1 story, 40 x 50 ft. shop at 8562-64 Vincennes Ave.

Mass., Barnstable—W. Jordan, Oak Neck Rd., Hyannis, plans the construction of a woodworking shop at Oak Neck Rd., Hyannis Section. Estimated cost $40,000, including equipment.

Mass., Cambridge (Boston P. O.) — Jenny Mfg. Co., 8 India St., Boston, is receiving bids for the construction of a 1 story service station at Concord Ave. and Alewife Brook Parkway. Private plans.

Mass., Fall River—Pilgrim Leasehold Co., 44 School St., Boston, had plans prepared for the construction of a 2 story, 65 x 160 ft. garage, etc., on Ninth St. here. Estimated cost $45,000. Private plans.

Mass., Watertown — New England Telephone & Telegraph Co., 50 Oliver St., Boston, awarded contract for a 1 and 6 story, 85 x 265 and 105 x 180 ft. warehouse and garage at Mount Auburn and Grove Sts. Estimated cost to exceed $40,000. Noted Jan. 1.

Mass., Worcester—City, plans the construction of a garage. Estimated cost $50,000. Architect not selected.

Mich., Hamtramck — Gear Grinding Machine Co., Christopher and Conant Sts., Detroit, plans a 1 story addition to plant here. Estimated cost $30,000. L. R. Hoffman, Grosse Pointe, Archt.

Mich., Wyandotte—Detroit Brass & Malleable Co., 1177 Holden St., Detroit, awarded contract for a 1 story addition to factory here. $40,000.

N. J., Bordentown—Dept. of Institutions & Agencies, Trenton, will build a new dormitory at Bordentown Manual Training & Industrial School here. Estimated cost $160,000.

N. J., Maplewood—LeRoy Schenck, 513 Valley St., will not construct 2 story shop and garage. $40,000. R. B. Flatt, 600 Bloomfield Ave., Bloomfield, Archt. Project abandoned. Noted Jan. 15.

N. J., Newark—Bd. of Education, City Hall Annex, is having revised sketches made for the construction of a 5 story repair department building at Coes Pl. and Marshall St. Estimated cost $200,000. Architect not announced. Noted Dec. 4.

N. J., Orange—T. Sangiaconio, Collins St., is receiving bids for a 3 story, 35 x 55 ft. factory at 160-64 South St. Estimated cost $45,000. A. P. Nucciarone, 200 Central Ave., Archt. Noted Jan. 15.

N. J., Roselle—Hubeny Bros., 615 East First Ave., is having revised preliminary plans prepared for a 1 story addition to machine shop on East First Ave. Estimated cost $40,000. W. L. Finne, 1201 East Grand St., Elizabeth, Archt. Noted Jan. 23, 1930.

N. Y., Brooklyn—Bayridge Fireproof Storage Corp., 322 9th St., is having sketches made for the construction of a 105 x 150 ft. repair shop, garage, etc., at 5th Ave. and 63rd St. Estimated cost $125,000. H. G. Harrington, 311 100th St., Archt.

N. Y., Brooklyn—Nanman Building Corp., B. Zisku, Pres., 10360 104th St., Richmond Hill, will build a 100 x 161 ft. service garage, gas station, etc., at 86th St. and Ave. W. Estimated cost to exceed $40,000. W. A. Lacerenza, 26 Court St., Archt. Work will be done by separate contracts. **Maturity about September.** Noted Jan. 29.

N. Y., Brooklyn—R. E. W. Realty Co., Inc., 160-09 Jamaica Ave., Jamaica, is having sketches made for the construction of a service garage and gas station at 20th Ave. and 7th St. Estimated cost $45,000. M. Marlo, 200 Beverley Rd., Archt.

O., Cleveland—The Cleveland Flux Co., K. H. Baum, Pres., 1026 Main Ave., awarded contract for a 2 story, 50 x 100 ft. factory at 1130 West 11th St. Estimated cost $40,000.

O., Gambier—Harcourt School, c/o W. G. Mather, 12407 Lake Shore Blvd., Cleveland, awarded contract for a group of college buildings, including administration building, service and locker building, etc., here. Estimated cost $500,000. Maier & Walsh, 7016 Euclid Ave., Cleveland, Archts.

O., Lima—Garrell-Carnes Foundry Co., manufacturers of gray iron castings, plans to rebuild part of plant recently destroyed by fire. $35,000.

O., Middletown—Raymond Paper Co., awarded contract for a 1 story paper bag factory. Estimated cost $100,000. Noted Jan. 29.

Ore., Portland — Oregon Brass Works Inc., W. A. Prier, Asst. Mgr., 73 North Second St., acquired a site and plans a new 1 story plant. Estimated cost to exceed $40,000.

Pa., Greenville — Sterling Oil Co., R. S. Newton, Emlenton, awarded contract for a 1 story service station at Penn and Main Sts. here. Estimated cost $40,000. Noted Dec. 11.

Pa., Philadelphia—Philadelphia Storage Battery Co., E. Davis, Ontario and C Sts., awarded contract for a 5 story, 94 x 250 ft. factory at C and Tioga Sts. Estimated cost $300,000 including equipment.

Pa., Wilkinsburg — Calorizing Co., manufacturers of metal tubing, alloy metals, etc., awarded contract for a 2 story, 96 x 132 ft. foundry nad pattern storage building.

R. I., East Providence — Artesian Well & Supply Co., c/o E. B. Whipple, 87 Weybosset St., Providence, Engr., awarded contract for a 1 story, 85 x 100 ft. storage building on Blanding Ave. Estimated cost $40,000.

S. C., Columbia—Standard Oil Co. of New Jersey, 700 Pendleton St., Columbia, plans the construction of a garage and service station at Gervais and Marion Sts. Estimated cost $40,000.

Va., Amherst — Southern Mineral Co., subsidiary of Vanadium Corp., 120 Broadway, New York, N. Y., awarded contract for addition to plant here. Estimated cost to exceed $40,000.

Wash., Camas—Crown Willamette Paper Co., plans addition to 350 ton paper mill. Estimated cost $50,000.

Wash., Seattle—Dept. of Highways, Olympia, awarded contract for maintenance shop building and office at 6th Ave. S. and Spokane St., here.

Wash., Seattle—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., awarded contract for main assembly building, oil house, 500 ft. dock, etc., also for dredging waterway, filling and removing docks and bulkhead on site of plant in connection with automobile assembly plant. $3,000,000. Noted Jan. 29.

Wash., Seattle—Weber-Rodgers Co. (merger of Rodgers Cabinet Mfg. Co., Dexter Horton Bldg., Seattle and Weber Showcase & Fixture Co., 123 Queen Anne St., Los Angeles, Calif.) plans the construction of a large manufacturing plant in Seattle.

Wis., Kewaunee—F. Hamachek Machine Co., awarded contract for a 1 story, 60 x 140 ft. machine shop and 60 x 80 ft. foundry. Estimated cost $75,000.

Wis., New London—American Plywood Co., had plans prepared for a 1 story, 70 x 160 ft. addition to factory for the manufacture of veneers, plywood, cabinets, etc. Estimated cost $50,000.

Ont., Fergus—Beatty Bros., plans two additions to factory, 1 story, 50 x 100 ft. each for the manufacture of agricultural machinery and household appliances. Estimated cost $100,000. Private plans.

Ont., Hamilton — Hydro-Electric System of Hamilton, 12 King St. E., plans extensions to light and power system during 1931 including new garage building $80,000.

Ont., Niagara Falls—Fowler Oil Burner Co. of Canada, A. H. Labrie, Mgr., Queen St., plans the construction of a plant for the manufacture of oil burners and heating appliances. Noted Oct. 23.

Ont., Oshawa—Oshawa Industrial Foundation, Ltd., c/o Oshawa Chamber of Commerce, awarded contract for a 1 story, 100 x 150 ft. factory. Estimated cost $60,000. Coulter Mfg. Co., c/o Coulter Copper & Brass Co., 115 Sumach St., Toronto, lessee. Noted Dec. 11.

Ont., Toronto — Toronto Brass Machine & Foundry Ltd., 74 Market St., is having plans prepared for the construction of a 1 story brass plant on Leslie St. Estimated cost $40,000 to $50,000. J. A. Thatcher, 37 Cowan Ave., Archt.

Que., St. Hyacinthe—Technical School Commission, City Hall, will receive bids until Feb. 15 for a 3 story, 40 x 80 and 80 x 140 ft. technical school at Laframboise St. Estimated cost $175,000. G. R. Richer, Bank of Commerce, Archt.

India—Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich., will soon award contract for assembly plants in Bombay, Calcutta, Madras and Multan here. Estimated total cost to exceed $1,000,000.